# UrbanFarm2019: Projects for the former Zanussi area in Conegliano

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**Curators:**

Francesco Orsini, Giuseppina Pennisi, Michele D'Ostuni, Mattia Paoletti, Gloria Steffan, Denisa Kratochvilova, Andrea D'Alessandro, Gianmarco Sabbatini

ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA




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Comune di Belluno



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UNIVERSITÀ DI BOLOGNA
DIPARTIMENTO DI SCIENZE E TECNOLOGIE
AGRO-ALIMENTARI

# OVER THE ROLE OF RESEARCH AND EDUCATION ON URBAN AGRICULTURE

**Giovanni Molari**

*Director Department of Agricultural and Food Sciences (DISTAL) - Bologna University*

While world cities are facing unstoppable urbanisation trends, the combined effects of arable land loss, resource scarcity and climate change put at risk our current food systems. Research into plant growing solutions adapted to urban environments such as building-integrated systems (rooftop greenhouses, indoor and vertical farms) or technologies for improved resource efficiency (following circularity in the use of resources or decreasing the urban energetic footprint) can allow for creating more sustainable cities.

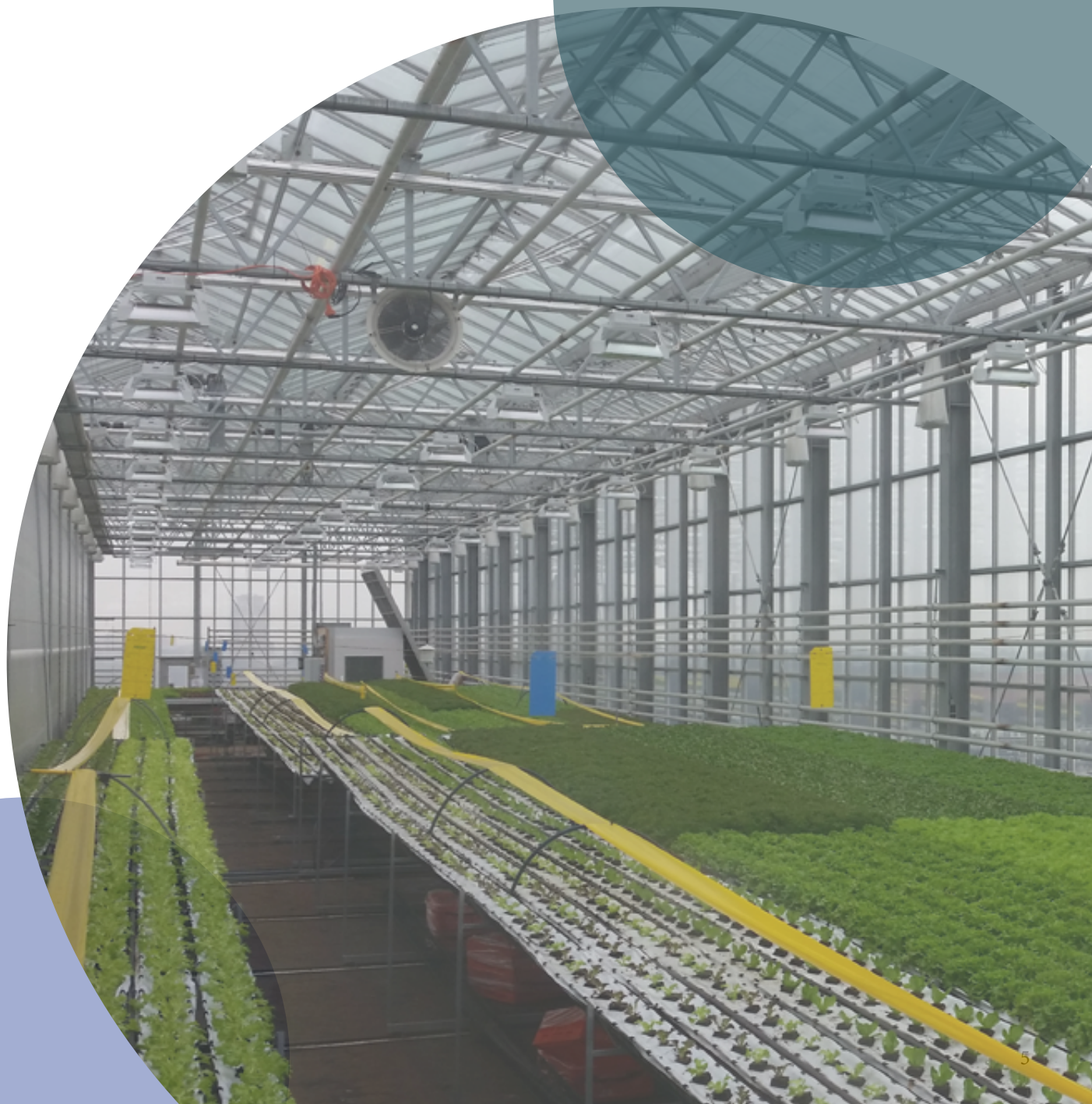
The Department of Agricultural and Food Sciences (DISTAL) provides state-wide leadership in research, teaching and extension in the subjects of horticulture, crop production, sustainable agricultural systems and environment and applied plant ecology. Its general mission is to develop and deliver educational and research programmes enabling students to become highly skilled and creative graduates, and fostering the adoption of profitable, environmentally sound, and socially responsive agricultural systems. DISTAL hosts the Research Centre on Urban Environment for Agriculture and Biodiversity (RESCUE-AB), which brings together skills and research expertise in the field of horticultural sciences, actively contributing to a number of interdisciplinary activities in the fields of urban horticulture and biodiversity, in Europe and in several countries of the World South.

## UrbanFarm2019: students on the edge of urban renewal

Transferring agricultural technologies from the rural to the built environment cannot overlook the limits and opportunities provided by the urban infrastructures. On the other hand, the integration of plant cultivation into the urban landscape should not become a mere design exercise, but build instead on state-of-the-art solutions for plant cultivation, in order to turn competitive in the global food market. At the same time cities where food is produced, often see urban farming mainly as a strategy to address social exclusion. An urban garden can be used as a job training programme for youth that have dropped out from higher education, for refugees in their vulnerable stage of settling down in a new home country, or as an activity programme for people with disabilities. Accordingly, functional integration of agriculture in cities cannot discern from bringing together expertise in agricultural sciences, engineering, landscape and urban planning, architecture and both environmental and social sciences.

In order to explore the opportunities provided by regenerating one of the three target locations of UrbanFarm2019, students from different disciplines needed to meet on a common ground. Accordingly, this student competition was designed in order to allow fresh minds to join forces over a common objective. Beside the specific design and innovation that was brought by each team, the strength of UrbanFarm2019 is upon its founding principle. It allowed for inspiration and reciprocal cross-fertilisation between concepts and skills. It also resulted in fostering collaborations and networking opportunities for the participants, that were engaged in an international environment where they had to apply the subject studied in their educational path, but also defend and substantiate their arguments and proposed solutions.

I wish therefore to express my sincere gratitude to all participating teams that were successful in bridging knowledge, enthusiasm and devotion into the design of the projects that are summarised in this publication. I also thank the professors, lecturers and experts that engaged in the scientific committee and international jury works and all the companies and institutions that supported the realization of this first edition of the UrbanFarm challenge.



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ResCUE-AB

# INTERDISCIPLINARY KNOWLEDGE FOR SHAPING FUTURE CITIES


## Francesco Orsini

*Main organizer UrbanFarm2019*
*Chair Division Landscape and Urban Horticulture (ISHS) - Research Centre on Urban Environment for Agriculture and Biodiversity (ResCUE-AB), Bologna University – Alma Mater Studiorum*


### Urban Agriculture in the 21th century

In a rapidly urbanizing world, urban agriculture represents an opportunity for improving food supply, health conditions, local economy, social integration, and environmental sustainability. While a diversity of farming systems is encountered in the different world regions, it is estimated that about a third of urban dwellers is involved worldwide in the agro-food sector. In recent times, urban agriculture projects have sprouted across the world, both guided and promoted by governments than born by bottom-up community based initiatives. Accordingly, the concept of edible urban landscapes is today finding application all over the world.

As plant cultivation gets inside cities, a first limit is set by space availability. Hence, the implementation of innovative growing systems generally occurs through adaptation of state-of-the-art technologies developed in the rural contexts and/or by integration of growing solutions specifically designed for the urban concrete infrastructures. These are the cases of the building integrated rooftop greenhouses, the vertical cultivation of plants on greened building facades or even the conversion of abandoned buildings into plant factories through artificial lighting by use of LED technologies.

Once plant cultivation within the urban fabric becomes technically feasible, it is crucial to define its sustainability, addressing how its three spheres (social, economic and environmental) are affected by a single or a combination of technical solutions, management systems and business models.

From a social perspective, urban agriculture is often a mean for the promotion of intercultural dialogue, social inclusion and community building. Urban gardens are also found in schools, where they offer optimal teaching tools for different disciplines, also through application of experiential learning methods.

On the other hand, assessing the economic sustainability of urban agriculture is often a quite complex and eventually controversial exercise. This since, beyond food production, the quantification and monetization of the associated benefits need to be appropriately addressed. Recent researches have shed some light onto the financial and economic evaluation of urban agriculture projects, particularly addressing the definition of viable business model typologies.

From an environmental perspective, urban agriculture can directly reduce the city footprint since it reduces the impact associated with food transport, but also by improving the resource efficiency of the urban ecosystem (e.g. when organic wastes are composted, or rainwater is collected), or mitigating the urban heat island effect through plant transpiration, overall resulting in a reduction of the city emissions of carbon dioxide.
In order to facilitate a wider uptake of innovative policies and tools for the promotion of the sustainable goals associated with urban agriculture, it is therefore crucial to create awareness on both institutional actors and the civil society as a whole through innovative and interdisciplinary approaches.

## UrbanFarm2019: an international and interdisciplinary competition for turning urban vacant lands into sustainable urban regeneration spaces

The international student challenge "UrbanFarm2019" aims to tackle the current need for cross-pollination between different disciplines by bringing together students from different fields of study into international teams addressing the regeneration of three vacant urban spaces in the cities of Bologna, Belluno and Conegliano. Target projects differ from their original purpose and include:

- A former agricultural farm that was absorbed by the urban-sprawl in the second half of the 20th century and acquired by the city council in the late eighties.
- A factory of domestic appliances, that largely contributed to the evolution of Conegliano city in the last 70 years, but was finally closed in 2003 after the company moved away the production.
- A primary school that suffered from the progressive abandonment of Belluno city outskirts and was closed in 1992.

What these location share is that they all are vacant and constitute a cost and a missed opportunity for their cities. Within the UrbanFarm2019 challenge we aimed at showing that another use for these spaces is possible, overall contributing to creating cities that are more attractive, more liveable, more inclusive and overall more sustainable.
To reach this target, we engaged young minds and asked them to meet and work in international and interdisciplinary teams. UrbanFarm2019 became an opportunity to bridge viewpoints and approaches and integrate state-of-the-art technologies and design for urban farming with functional urban planning.

This publication summarises the main ideas, visions and approaches that student teams brought together with enthusiasm and dedication for the city of Conegliano. We trust that starting from these project ideas, inspired local administrators and urban planners will foster sustainability and liveability of our cities.

## Beyond UrbanFarm2019: the path forward

The major achievement of this competition stands upon the geographical distribution and expertise covered by the participating teams. The international student challenge URBANFARM2019 achieved to engage a network of experts and urban agriculture practitioners from universities from all over the world in the evaluation of 35 projects prepared by teams involving more than 130 students. Looking at the projects it clearly appears how competences were successfully integrated and communicated in both project redaction and visual materials. We see a future in close collaboration with the International Society for Horticultural Sciences (ISHS) and its Landscape and Urban Horticulture Division. Stay tuned and join the upcoming editions of UrbanFarm.

# THE CHALLENGE

**To boost urban renewal through urban agriculture, the University of Bologna Alma Mater Studiorum and the University of Florence jointly organized the Student Challenge, UrbanFarm2019.**

## 3 months of time to redesign

## 3 locations, taking into account

## 3 spheres of sustainability

Increasing of urban population is leading to re-design and re-place centres of food production in order to make cities more sustainable and to foster the creation of new economies.

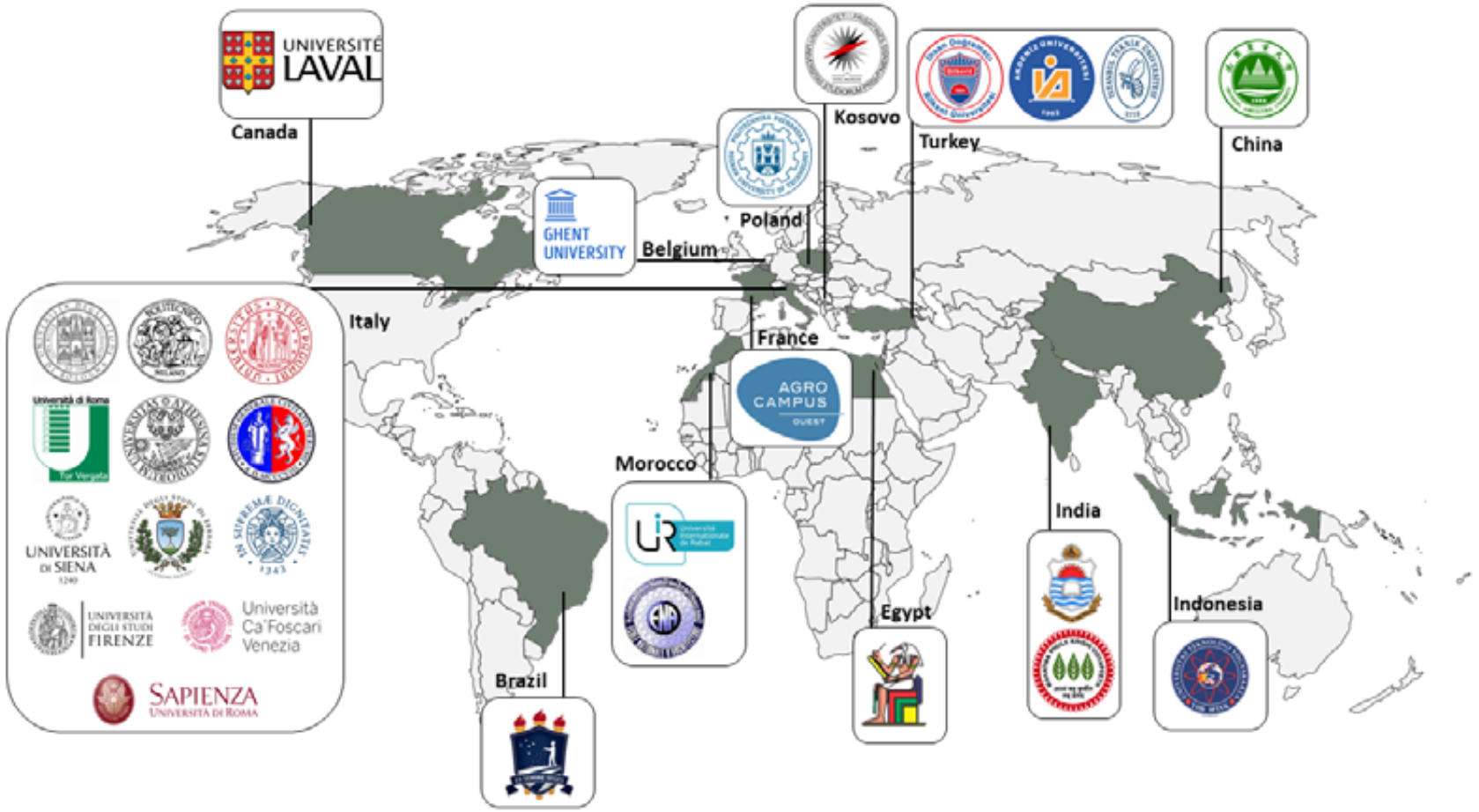
### The Challenge

The competition, involving international teams of students from higher education in Agriculture, Biology, Architecture, Design, Economics, Engineering, Humanities and Social Sciences, aimed at designing innovative urban agriculture systems that integrate the best architectural and technological innovations to produce plants in urban environments. Three buildings, identified in the municipalities of Belluno, Bologna and Conegliano (Treviso), were studied and redesigned by the different student teams, in order to propose the best strategies in the three pillars of sustainability (economic, environmental and social). Teams were ranked based on their choices and building solutions related to the use of growing systems and climate management, as well as the strategies for water and mineral nutrition and integrated pest management. Interventions also had a strong social and business connotation, promoting the generation of new forms of employment for disadvantaged users. The competition involved students from all over the world, evaluated by an interdisciplinary and international jury.

### Background

The competition was jointly organized by the Department of Agricultural and Food Sciences and Technologies (DISTAL) of the University of Bologna and the Center of Bioecological Architecture and Technological Innovation for the Environment (ABITA) of the University of Florence.
The challenge is also supported by the Institute for Environmental Sciences and Technologies (ICTA) of the Universitat Autonoma de Barcelona, the Agricultural Department of the University of Naples, the Universitad Politecnica de Cartagena, the Universidade Federal Rural do Pernambuco, the Ege University of Izmir and the Zvent Ivan University of Budapest.
Activities were supported by the International Society for Horticultural Sciences (ISHS), the Italian Society for Horticultural Sciences (SOI-HS), Alma Mater

*Home universities of students involved in the challenge*




Foundation (FAM), the FICO Foundation, the Pilastro Development Agency (Bologna) and the Municipalities of Bologna, Belluno and Conegliano. It also contributed to the innovation of educational tools in higher education toward business urban agriculture developed within the Erasmus+ project "Western Balkans Urban Agriculture Initiative (BUGI)", coordinated by the University of Serajevo and partnered by the University of Bologna, the University of Mostar, the University of Peja, the University of Pristina, the Nova Dorica University of Podgorica, the University of Ljubljana and the South Westphalia University of Applied Sciences. Media partners include SilvioFritegotto.it, AgroNotizie and Edagricole New Business Media.

Main sponsors included Flytech srl, NovelFarm, Coldiretti Treviso, Coldiretti Belluno and Daku. The initiative was also supported by Irritec, Fondazione Banca del Monte e Cassa di Risparmio di Faenza and the Contamination LAB.

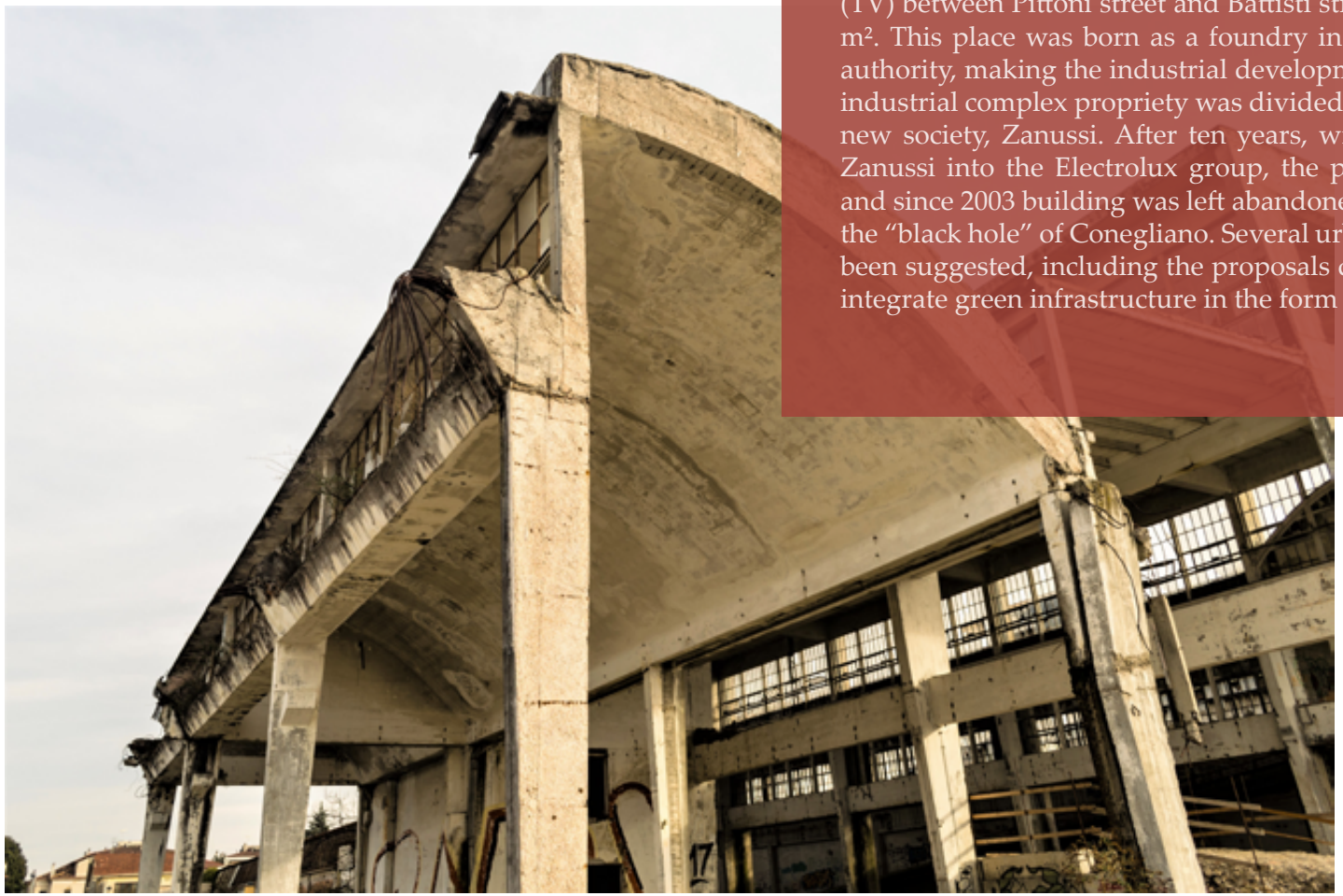
The main aim of UrbanFarm2019 challenge is to design innovative urban agriculture systems that integrate the best architectural and technological innovations to produce food in urban environments. It also aims to promote multidisciplinary and international cooperation between universities all over the world.

Inspiration for implementing this challenge was provided by the Student Challenge 'Design the Ultimate Urban Greenhouse' recently organized by Wageningen University & Research, The Netherlands.

# THE LOCATION

**Conegliano – Ex-Zanussi**

The former "Area Zanussi" is located in the city center of Conegliano (TV) between Pittoni street and Battisti street, covering an area of 165˙000 m². This place was born as a foundry in 1948, over the Zoppas family's authority, making the industrial development of the city start. In 1974 the industrial complex propriety was divided between Zoppas family and the new society, Zanussi. After ten years, with the evolution from Zoppas-Zanussi into the Electrolux group, the production centre was relocated and since 2003 building was left abandoned. Since then, the place is called the "black hole" of Conegliano. Several urban regeneration strategies have been suggested, including the proposals developed in UrbanFarm2019 to integrate green infrastructure in the form of an urban agriculture project.



# PHOTOS

# THE FORMER ZANUSSI NORTH AREA IN THE PERSPECTIVE OF URBANFARM 2019


## Giovanni Tel

*Director of Government of the territory and development of productive activities sector of the City of Conegliano*


The town development plan of the city of Conegliano has offered the opportunity to test new forms of territorial development, as well as significant chances to regenerate the urban space, especially in those contexts that were already scenarios for the socio-economic development of the city.

The launch of planning initiatives based on the innovation of the regulatory framework aims to achieve concrete objectives to improve the quality of architecture / urban design and the quality of life and to fully live the opportunities offered by the city. UrbanFarm 2019 marked, in this sense, a phase of significant scientific interest.

This attitude to consciously approach urban subjects and - in particular - to deepen and define new models of improvement of urban quality, follow a path marked by the european experiences, that have laid solid foundations for a more coherent representation of the present city, the so-called visible city, often seen as a place to consume and to be consumed, thus losing an important reference that, while respecting the urban environment as a whole and the quality of the physical elements that compose it, is summarized in the current phase of rediscovery of the concepts of urban limit and cultural elevation of the centralities to redevelop the municipalities.

The experience of UrbanFarm 2019 can be summarized in the ability to recompose concepts that years ago appeared in some ways in perfect contrast, but today, however, lead to new ways of approaching urban issues and problems, innovative ways of interpreting and driving the processes of development of a city that - increasingly - tends to reflect on itself, thereby taking the principle of sustainability as a priority reference for declining its social, economic and environmental evolution in the territory.

The design lines that have faced the challenge of UrbanFarm for the northern area of the former Zanussi in some way support the future of our city, in order to start a path of evolution of its urban environment thanks to an action plan that, in addition to addressing the issue linked to the "reanimation" of the urban center, does not place in second order initiatives of urban reorganization of the areas immediately adjacent, taking into account that complex processes of recombining road networks and building fabrics that increasingly need initiatives aimed at the reorganization and redevelopment of the relevant urban space.

From this point of view, the project proposals testify not only the urgency of achieving a

definitive regeneration, but also constitute authentic “sparks” of reflection on the metamorphosis of the former Zanussi area, part of a city in evolution and partiallyredeveloped, whose architecture, so different from the more usual profiles of the Venetian city, appears at the same time very close to the pressing requests for reorganization coming from many parts.

UrbanFarm’s design proposals give us hope because they have revolutionary potential, detaching themselves from the usual matrix of urban development and representing extremely significant and paradigmatic examples of an alternative evolution of the urban landscape. In some ways, the UrbanFarm “model” can be the start of a process that can also be replicated in other contexts of the city, involving interstitial areas within the city perimeter, which play a delicate role as areas of recombination between thehistorical city and the contemporary one, including areas - therefore - where the balanced coexistence of different styles and variable forms of living finds substantial and essential mediation in the careful formulation of the main urbanization interventions and in architecture.

# Final requirements description

The deadline for the submission was January 15, 2019. Each team sent a written document, 3-minute video, proof of the concept and photo of the team. In the text below, you can view detailed conditions of elaboration that the participating teams had to follow for the admission to the final event.

Written document
Very first condition was to create a written document which described the whole concept of the project. Was important to mention all benefits that each project would brings. Most important part of the final dossier should be proof of sustainability, feasibility, reliability, attractiveness and added value for society, as well as economics and environmental functions in general. Maximum range of the document was 60 pages (including annexes).

Every paper should contain:
Total concept (summary of the total concept, main aim and main innovations used in the project): max 3 pages

- Urban farm design, depending on which location chosen (architectural and agricultural solutions included in the project): max 9 pages
- City/District functionality (social and environmental value of the project): max 9 pages
- Economic feasibility and sustainability including Business model: max 9 pages
- Annexes (including design, renders, growing technologies uses): max 30 pages
- Recommended parameters of the paper: Font: Arial, Tahoma, Calibri, Sans Serif
- Text size: 12 (minimum 9)
- Spacing: 1,5 (minimum 1)

The written document has been sent anonymously and the only reference was the identification number of the team. This was an ELIGIBILITY condition.

# TEAMS

## WINNING TEAM

### The Wanderers

Haidy Takieldin Adel Ali Mousa, Hadil Tarek Abdelaty Abdelhafez, May Loaay Mohamed Elhadidi; Pietro Tonini, Lorenzo Fellin, Virginia Castellucci, Antonella Frongia
Universities: Cairo, Bologna, Trento

## OTHER TEAMS

### YS Design

Youssef Mohammed AbouZied, Sara Samir Abouelsoud Mohamed
University: Cairo

### Green Senses

Kenza Ammar, Kinga Rękosiewicz, Paweł Datkiewicz, Stefano Gasperini
Universities: Roma, Ecole Nationale d'Architecture (Rabat)
TU Poznań

### Phoenix

Ricardo Souza, Alan Silva, Stella Áurea, Hélder Santos
University: Universidade Federal Rural de Pernambuco (UFRPE)

### Symbiosis

Gaia Pazzagli, Nicoletta Vettori, Elisa Matutino, Elena Pagani, Francesco Uboldi, Davide Tita, Anne Bankeng Maffo
Universities: Firenze and Bologna




# WINNING TEAM

## The Wanderers

**with:**

## GILGAMESH

Haidy Takieldin Adel Ali Mousa, Hadil Tarek Abdelaty Abdelhafez, May Loaay Mohamed Elhadidi; Pietro Tonini, Lorenzo Fellin, Virginia Castellucci, Antonella Frongia

# URBAN FARM 2019


NOMI

## Gilgamesh – Urban Farm 2019

## Total concept

- **Overview**

According to the United Nation, 68% of the World population will live in cities by 2050. During the last decades, cities rapidly have been turning into inhospitable place while global population constantly grow and resource run low. A transition in needed to make our cities more sustainable that taken in account these these trends and fulfill the new requirements and needs of the present and future cities inhabitants. In this context has been implemented the project GILGAMESH located in Conegliano, Italy. The aim of this project consists in the conversion of the ex – Zanussi Area (Conegliano) from a black hole to a green lung giving a new purpose. The structure, which previously housed a foundry that symbolizes the economic boom of the 60s, currently is in a state of strong degrad. Although there have been several opportunities for redevelopment from different social partners, the building is still discharged, resulting in a strong impact on the city center and the attractiveness of the neighborhood.

The name of the project is taken from the famous epic poem of GILGAMESH. Within the numerous quests that Gilgamesh had to face during his journey there is a recurring concept: Transformation. In the epic poem, Human transformation from the wilderness occur when it starts to turn raw material into a product, or so called processed. *"Such as oil from olives, bread from wheat and beer from hop"*. Within the project this concept of transformation is used to underlines human potential to transform the matter in different field such as: Agriculture, Art and Architecture.

The wide area of old factory will be divided to hold different functions while keeping the old building structure. (As shown in Figure 2)The wide spaces of the factory will host an integrated **art-agriculture training center** with spaces shared by artists, agronomists and farmers to share their knowledge and experiences. The project aims at build an educational model through as a long journey, on contrast to the raising "food pornography" trend proposed in social media, where the food pleasure is reduced to the mere visual contemplation. We want to transmit the satisfaction of producing by linking the individual to the process instead of the client to the product. Although, the urban area will be regenerated physically and in terms of purpose, our intention is to build the new green area identity considering and respecting the history of the ex-smelter plant.


Agriculture activities will be performed in-door thanks to hydroponic vertical system called Zipgrow, this approach will use LED light low consumption and water recirculation system which reduces water and nutrient waste. Thanks to this design Zipgrow system is easy to move outside and perform the cultivation without the use of artificial light and climate control during the warmer season. Following the GILGAMESH concept, a microbrewery will be established using a traditional brassage where a double-tank system is used for warming and fermenting in the beer production. Local fruit and hop will contribute to the differentiation and amplification of the breweries products along the years in order to accomplish with the emerging requirements of the customer. The mushroom factories will be utilised the by-product of this process for producing the Oyster mushrooms performing an interesting example of integrated process aimed to decrease the cost and limiting the waste of input.
The outdoor area will host a wide range of local fruit and flower varieties and a dedicated area for hop production. In order to allow planting, raising bed will form where concrete is already compromised. The raising bed will be gradually fill with organic substrate derived from the other in-door activity performed in the building. Indeed, the substrate resulting from digestate of the beer production, mushroom cultivation, pruning and exhausted hydroponic media.

**1. Planting the art**
By integrating art and agriculture, we will encourage the inhabitants of Conegliano to protect the cultivated area by increasing their awareness about the urban farming importance and teaching them how to grow plants in their homes using fun, innovative and artistic ways. In order to enhance the social pillar of sustainable development, Art and Agriculture will blend in one public space. These two components will be mixed to provide an educational multi-approach where agriculture can support the educational process of art and vice versa. Therefore, the artists and farmers work together and teach the youth new techniques to produce an artistic product from the plants (as illustrated in Figures 3 and 4). Even Horticulture products will be used as materials as pigments and wood for the artists and exhibit the products in the gallery.
.In the other way, art will enhance the educational process for establishing master course on breweries and mushroom. Indeed, these two techniques will be displayed through the support of art activities like Graffiti. The educational process is established to create a cycle of training of trainer where the output are people that could be involved in the project as teacher or that can find an employment in a private company.

**2. The dome of imagination**
The dome is designed for rentable studios for artists because they need spaces to inspire them while they are working. The rooms are located below the ground level to keep the artists away from any source of noise and distraction. The ceiling of the rooms are replaced with a dome for a wider view for the surrounding, then a light well is inserted in it, to catch the inspiring nature of Conegliano. While moving the light well on a circular path in the dome, the artists have different views all the day (a conceptual idea is illustrated in Figure 4). The dome is on a drum to create openings for natural ventilation. The dome is made from ETFE as it is a recycled sustainable material, and also it is a non-sticky material so the domes will not catch any dust from the air and thus a clearer view.(as presented in Figure 6)
At night, the studios are illuminated by LED lighting and the light well act as an exterior lighting element for the garden with different orientations that gives an attractive feature for the building inspired from the lighting in the music concerts in Conegliano (as illustrated in Figure 7).
Every four rooms are connected together with an English court. The artists can reach their rooms through stairs and ramps from the landscape outside (As demonstrated in figure 8).

- **"Farming tour" app.**

To arouse people's curiosity to grow crops using technology, an educational mobile game application will turn the process into an URBAN GAME. It is about a team work in levels where the application provides the team with the basic information they need and organize the process of plantation through tips and schedules for irrigation and fertilization. The team gets points for completing the levels and finally teams compete together to get awards and exhibit their work so that increase social interaction between users. (The application is fully described in Figures 9 and 10). Each level is defined by a checkpoint with a dome as a gathering space for more interaction. (As shown in figure 11).
The place will be open to visitors, which could also choose to be involved in the plant production more regularly. The area is designed to drive both occasional and regular visitors into an input-education-output cycle. In this way the user is also seen as the employer, and vice-versa.
The openness to visitors and various events is a crucial aim of the project. The indoor space would be multifunctional and very dynamic, turning upside down the traditional agro-industrial vision. However, our intention is not to create a simply market-oriented area but to encourage social

relationships within the community and a connection with the territory, based on the greatest land enhancement. The structure dynamic will be possible through a movable walls system and multifunctional foldable furniture by using roll bar panels. The versatility will ensure a completely free usage of the structure leaving to the local community the possibility to have free expression of their willingness.

## Description of interventions:

The project has two main approaches northern and southern. Where the northern entrance is for the art wing as it passes through the art gallery and the art center till it reaches the heart. Shared space and a restaurant for all the users of the building with educational center and labs overlooking the space. While the southern entrance is defined by the green house inside and an organic food market. It allows the users to pass through the farming wing to see all the farming process till they reach the brewery observing the beer production and taste the freshly brewed beer (as illustrated in Figure 12).

### Art Center and Gallery:

A Huge space that holds different types of artworks; graffiti, planting the art and painting. Which is also used to decorate the building's facades (as shown in figure 13). The art center is connected to the gallery through movable walls where the artists use to demonstrate their art works and when they finish they rotate it to face the gallery. On the other hand, the gallery is overlooking the art center through an upper level to witness the process of art creation and innovation (as demonstrated in Figure 14).

### Education center:

Research labs, classes and a hall for hosting courses and group discussions to provide courses for the artists and farmers as well as disadvantaged social categories as refugee, people with disabilities and ex-cons. The interior design of the courses hall is mainly groups of concentric stages separated by temporary partitions that could be assembled by the users according to their needs (as shown in Figure 15).

### Restaurant:

Provide fresh food grown in the farm to the users. The restaurant's position is central to serve all users. The services area is covered in an upper dining area to provide visual connection with the other uses in the building (as illustrated in Figure 16). Besides, an organic food market is located in the south near the site to serve the residential area.

### Microbrewery:

The design of the brewery integrates the production area with the selling ,tasting and crafts area through the glass partitions so the user observes the wort production area, the raw material preparation even the packaging process (as shown in figures 17 and 18).

### Indoor farming area:

In order to fulfill the requirements of Zipgrow greenhouse, the wooden roof is replaced with transparent material in the southern part to permit sunlight, and the brick wall is replaced with openable curtain walls to convert this area into an outdoor area when the climate is warm but crops that require shading are located inside to provide a green view to users inside. On the contrary, the mushroom production area is in the center and covered with solid walls and roofs to prevent sunlight and provide humidity.

### Shared space:

It is expected one universal space shared by all types of users and visitors (as demonstrated in Figure 18). The space is divided by a bridge crossing all functions starting with interaction space and ending over the zipgrow area. This allows the visitors to have a full live experience in the building.(As explained in Figures 20 and 21).

The design of the added interior spaces are illustrated in Figure 22.

## Swot Analysis

In the following schemes is represented strengths and weaknesses, opportunities and threats of the project.

*Strenghts:*

- Presence of a highly qualified team: the collaboration of students from different universities and courses will allow the supervision of the project in several aspects, contributing to the implementation of a high added value initiative;
- Design synergies linked to multidisciplinarity: the joint design, activated in a multidisciplinary context and accomplished thanks to the adoption of mixed forms of competences will correspond to the unequivocal value of the intervention.

*Weaknesses:*

- Several attempts limited to strong constraints in past experience: in the past, numerous preliminary projects have been proposed by both public and private stakeholders in order to improve the conditions of the building. Nevertheless, the presence of numerous constraints of various kinds did not allow the feasibility of the proposals presented.

*Opportunities:*

- Strong need for the citizen of spaces in which to devote himself to the appreciation of art and nature: the city, although provided with green areas, is lacking in shared public spaces aimed at achieving greater social connection. The idea of creating a green lung for the city of Conegliano fully satisfies this requirement;
- Policies favorable to sustainable actions: local, national and European policies allow strong support for the project presented below. Community policies provide programs dedicated to the improvement and greening of European cities, for example URBIS and URBACT are tools that allow to frame the project as eligible for funding, except for a proof of concept that makes it accessible to the entire citizenship, as well as disseminable in the whole city.

*Threats:*

- Innovative activity in the area of reference, poor management know-how: the uniqueness of the project, unfortunately, makes it difficult to estimate the managerial skills necessary to ensure excellent governance of the processes in place on the intervention. In any case, the forecasting skills learned thanks to the examination of "similar" projects have allowed the team to obtain great advantages in estimating the needs, making it reliable.

# 2. Urban farm design

## 2.1 SURROUNDING AREA

The outdoor area surrounding the industrial building is covered with concrete. However, wild trees and shrubs already started to colonize the numerous cracks that formed on the surface, expanding them. This project aims to take advantage of this fact and form uncovered raised beds areas where the concrete is already compromised, maintaining the rest as a walking path which allows visitors and staff to easily access the green beds. These green areas shown in Figure 1, will be delimitated using a 40 cm fence constructed using the remaining of the removed concrete and additional cement. The perimeter created this way will allow the possibility to raise ground level initially adding soil and further on adding the digested by-products of beer, mushroom and vegetable production (See Paragraph …). The outdoor design consists on 3 different areas. One dedicated to local fruit trees growth (orange coloured in Figure 1), one formed by many smaller beds dedicated to horticultural annual crops, aromatic and flower plants (green coloured in Figure 1), and a long pergola corridor dedicated to hop growth (yellow coloured in Figure 40).

*Figure 1: Green areas used for horticultural production resulting from the removal of compromised concrete.*

### 2.1.1. Fruit tree area

The 3 species chosen to inhabit the 3 major beds are apple, fig and cherry. 3 local varieties, traditionally grown on Treviso's hills have been selected to enhance and support the local biodiversity: Mela di Monfumo (Monfumo's Apple), Figo Longhet di Tarzo (Long Tarzo's Fig), and Ciliegia dei Colli Asolani (Asolani's hills cherry). Every fruit variety will be pruned differently taking into consideration pre-extensive techniques which utilize low and medium plant density. This approach not only will favour natural plants growth thanks to the most appropriate cultivation method forms (Figure 1), but will also permit to create an useful and educational portray of different pruning methods. This will show to visitors how farmers, thanks to the scientific knowledge developed in century, are able to cooperate with nature to reach a productive goal. (insights aboud plant growth and development, different fruit trees cycles, buds, chilli requirement).

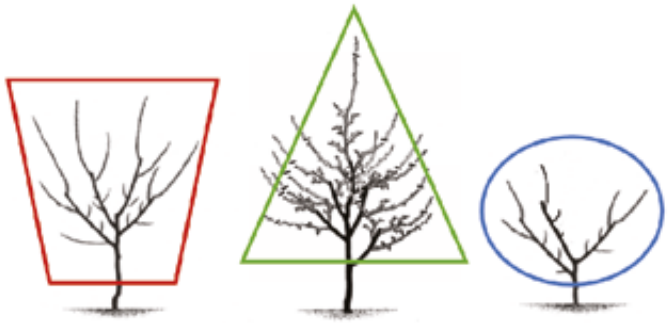


*Figure 3: Figure 3: Different training systems adopted for the 3 different tree species. Vase for cherry trees, central leader for apple trees and eventually globular bush type for fig trees.*

*Ciliegia dei Colli Asolani*. According to maps of the nearby town of Maser, this cherry trees were planted in the area more than 300 years ago, but they were first established here even before, during the middle age in the XIII Century[1] . This cultivar was greatly reduced in number after the world wars, but it is now gaining more importance thanks to a local certification designed to protect and value its origin, the De.Co. Trevigiana. According to the local newspaper, there are now 12000 cherry plants in the traditional area[2], maintaining its production exceptionally traditional.

The chosen training system is traditional low-density Vase, where plants are not grafted. Suggested density for this training system is 300-400 plants/hectare, and considered the reduced surface available, and the educational aim, plants will be positioned at 4 meters distance between each other, having a 16 $m^2$ surface where to grow. Thanks to a professional pruning, fruit trees will have a traditional vase shape, with a maximum height of 5 meters, which will be reached after several years after transplanting. An establishment pruning will be performed in winter (November-February) at initial growing stage, one year after transplanting. This apical pruning will be performed at 60-70 cm above ground, right above a bud, allowing new branch formation. Next winter, 4-5 primary branches will be selected and maintained, and cut above a bud facing outside. This pruning system allows a control growth, which will permit healthy plant to grow for several decades, still allowing hand picking. Cuttings will be purchased at a local nursery. Cherry production is expected 3 years after planting, with a complete production, which ranges between 10 to 40 kilograms per plant, expected the 4th or 5th year after planting.

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pruning | | | | | | | | | | | | |
| Flowering | | | | | | | | | | | | |
| Harvest | | | | | | | | | | | | |

*Table 1*

*Mela di Monfumo.* Within this group of apples, are found traditional varieties cultivated for centuries before the introduction of more commercially valuable cultivar in the 70'. Within these "antique" varieties, so called by the association of producer of the area, 3 have been selected to be included in the project: *Ferro da Cesio*, *Pomo della Madonna* and *Calamani*. These varieties are available in the experimental fiend at "Parolini Institute of Bassano del Grappa" and will be purchased there. The cultivation method chosen to grow these apples is a Central Leader system (Fusetto), which done properly will allow a controlled plant growth of vigorous plants, still permitting the hand picking of the

[1] Vendramin, A. (2018). Maser e la Ciliegia. *Convegno sulla Ciliegia di Maser De.Co.* Maser

[2] Favero, E. (2018). Una stagione record per la ciliegia di Maser. *La Tribuna*, 23.

fruits also at plant older age. At initial stage, when transplanted plants are one year old, during the winter pruning is performed a cut at 60-70 cm of height just above a bud. Malus species will tend to grow vertically during the next season. Next year, it will be necessary to cut the leading branch formed by the higher bud at 25 cm length, leaving a new bud at the extremity facing the opposite direction respect to the one left the previous year. Similarly cut the other branches paying attention to leave the bud which faces the ground. This way new branches will grow horizontally and not vertically. To maintain this shape, it will be required also a summer pruning performed cutting additional sub-later branches. This methodology can hold a medium plant density (800-1000 plant/hectare), but considered the educational aim of the project, apple trees will be planted at 3 $m^2$ distance between each other, leaving 9 $m^2$ for each plant to grow. The expected production at maturation phase (5-7 years) is of 30-40 Kg per plant.

Fruit Characteristics per selected varieties:

- *Ferro da Cesio*. Dimension 55 x 62 cm, weight 90-150 g. Fruits have a sub spherical shape with green skin and shades of light red/pink. Short and thin stalk. Pulp is white, compact, sweet and slightly acidic. In italian "Ferro" means "Iron", a name given because of its hard pulp ad its long shelf life.
- *Pomo della Madonna*. Dimension 60 x 76 cm, weight 100-150 g. Conical shape, with wider size occurring closer to the long stalk. The fruit peel is light green, which turn red with stripes at final stage of maturation. The pulp is white, soft, sour and well known for its appreciated organoleptic qualities.
- *Calamani*. Dimension 58 x 65 cm up to 74 x 76 cm, weight up to 230 g. Heterogeneous shape, spherical, slightly flatten longitudinally. Peel is yellow, marmorized, rough with medium size lenticels. Stalk is short and large. At maturation stage, on sun exposed part of the fruit, the peel can turn reddish. Pulp is yellow, crunchy, aromatic, sweet and acidic.

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pruning | | | | | | | | | | | | |
| Flowering | | | | C | FdC | | | | | | | |
| Harvest | | | | | | | | | | | maturation | |

*Table 3*

*Figo Longhet di Tarzo*. Also referred to as "Figo Moro" which literally means "dark fig", is a fig variety traditionally cultivated in the nearby hills where soils were not adequate for the cultivation of more economically important crops. It naturally does not grow taller than 4-5 meters, but an accurate pruning allows an easier plant management. The tree form adopted to grow this fruit tree is one of the most natural, a free standing bush of globular shape. The main purpose of this training system is to create plants with short main trunk (of more or less 1 meter) and 3-4 major branches which grows laterally and form a globular foliage. Considering the vigorous nature of this fruit tree and the adopted training system, plant density will be low, maintaining plants at 6 m distance between each other, allowing a surface of 36 $m^2$ per plant. Pruning fig is recommended at final stage of the winter, during which also basal shoots will be removed. As many other fig varieties, this one carry 2 consequential fruit production, a minor one in late June/July carried out by apical buds, and a major production in September carried out by axillary buds which develop later. Fruits are produced at the third year of age, but satisfactory yields (70-100 Kg) are given after the 5$^{th}$ year. They are elongated and weight between 30 and 50 g each, with a peel which turn from green to a brown-purple colour, reaching almost a black colour at final stage of maturation. Pulp is red, soft and tender, sweeter and more aromatic that commercially grown figs.

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pruning | | | | | | | | | | | | |
| Flowering | | | | | | | | | | | | |
| Harvest | | | | | | | | | | | | |

## 2.1.2. Flowers

Flowers have a multiple role within the garden design. First of all, they will support other plant growth, both perennials and annuals, increasing pollinator and attracting beneficial insects, such as ladybirds and lacewings. Last but not least, they will play a fundamental ornamental role to ensure a great visual experience to visitors. Moreover, the selected flower plants are commonly growing in the foothills of the Veneto Alps (pre-alps), offering an important educational purpose into spreading knowledge which have been rapidly lost in the urban context. Informational boards will provide info related to flower characteristics and traditional uses of the different plants 'parts.

- *Astrantia major* L. (Astranzia maggiore) (Apiaceae). Herbaceous perennial, reach up to 1 meter of height. Beautiful inflorescence with a white crown form by bracts and numerous smaller white flowers, umbrella shaped, extruding in a large inflorescence. Flowering occurs from June up to September. Traditionally used for medicinal purpose, due to its diuretic and laxative properties.
- *Atropa belladonna* L. (Belladonna) (Solanaceae). Herbaceous perennial, reach up to 2 meters of height. Flowers are bell shaped, light purple with green tinges. Well known for its psychoactive and poisonous properties, and used both in cosmetics and in medicine.
- *Achillea millefolium* L. (Millefoglio, erba del sangue) (Asteraceae). Herbaceous perennial, can reach up to 1 meter height. The inflorescence has 4 to 9 phyllaries which contains up to 40 disk flowers which are white to pink. They are known to have a strong scent and to attract many pollinators. Flowering occurs in spring to autumn. Many are the medical properties of this plants. It was traditionally used as antispasmodic and anti-inflammatory and to quickly heal wounds. It was also often used in the traditional kitchen, as aromatic herb for soups and salads, or to produce liquor.
- *Vicia cracca* L. (Veccia montanina) (Fabaceae). Perennial leguminous plant, that can reach up to 150 cm of height. It shows blue and purple flowers positioned on the raceme, each holding between 10 to 30 flowers. Traditionally used to prepare soups and in mixed vegetables.
- 3 different Violaceae species have been selected to be planted. *Viola arvensis* (Viola arvense), *Viola canina* L. (Viola canina) and *Viola tricolor* L. (Fratini). All the selected species are small perennial herbaceous plants that have similar flowering time to the fruit tree planted.

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ch | App | Fig | | | | | | |
| *Viola arvensis* | | | | | | | | | | | | |
| *Viola canina* | | | | | | | | | | | | |
| *Viola tricolor* | | | | | | | | | | | | |
| *Astrantia major* | | | | | | | | | | | | |
| *Achillea millefolium* | | | | | | | | | | | | |
| *Vicia cracca* | | | | | | | | | | | | |

*Table 4: Flowering time of the different plants. Sources: (Nimis, Moro, & Martellos, 2013) (Scortegagna, 2016)*

## 2.1.3. Pest management

Choosing extremely local or traditional varieties, it is the first step to prevent the occurrence of major plant pathologies. Thanks to a long adaptation process and an accurate selection made by many farmers generations, these plants are more resistant to phytopathology naturally occurring in this

territory. For instance "Mele di Monfumo" such as the Ferro da Cesio variety, are resistant to hot and cold weather, and it gets hardly infected by plant diseases [3].

Particular care needs to be done to invasive insect species. For instance, all the planted fruit trees can be attacked by *Drosophila suzukii*, a well-known alien insect pest, a fruit fly, which is able to oviposit eggs within the fruit compromising fruit quality and promoting secondary infections. Apart from apples, which are less affected by this pest, figs and especially cherries can be severely compromised by attack[4] [5]. Pest control will be based on an IPM (Integrated Pest Management) strategy, where cultural practices play a fundamental role for prevention. These practices will be adopted within the project and shared with local farmers and visitors to spread good agricultural practices.

- Reduce favourable insect pest habitat. Considering that *D. suzukii* adults favour humid and cooler area, pruning plays a fundamental role to prevent pest occurrence and reduce damage. Winter and summer pruning will be aimed at increasing wind flow and reduce shadow in the inner foliar.
- Reduced host plants in the surrounding environment. This process is made easier by the garden design, which is based on different beds separated by concrete pathways.
- Eradicate favourable pest insect condition thanks to appropriate harvest and fruit removal. This practice is particularly useful to reduce Drosophilae pest attack, and it is based on the removal of mature and rotten fruits from the tree, which could attract pests and be easily attacked [6].
- Monitor and capture insect pest. The pest population will be monitored using chromatic trap to manage control approaches including the use of attractive traps used for mass trapping, an efficient organic practice.

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Harvests | | | | | Cherry | | | Figs | | | Apple | |
| Pest activity | | | | | | | | | | | | |

*Table 5*

## 2.2. INNER PART

Within the Ex-zanussi area will be established three types of production: horticulture product, brewery production and mushroom grow. Following the concept of GILGAMESH these process will be realised in order to show to the customer the complexity of the input transformation and the extremely importance of the human capital. In the follower chapter will be provided the specific for each process enlightening the methods and material selected.

### 2.2.1. Zipgrow

This vertical hydroponic system is the best suited to allow a continued production along the year which also permit to relocate it easily whenever necessary. At winter the vegetable production will take place indoor, supported by an independent heating system backed up by the heat produced during beer production and a dedicated LED illumination. From spring to Autumn, partial production will take place outside, with the main purpose to offer an educational journey through an evolving agriculture, based on a technological approach. Thematic such as urban agriculture, precision agriculture and growth optimization will be shared with the public in an easy and understandable way.

The ZipGrow design in order to grow plants vertically, uses a modular set up based on single phase towers. These metal towers have a housing, where the substrate is inserted, and a 2-4 centimetre narrow aperture where plantlets can extrude and grow. Although resistant, these modular towers are light weighted and can be easily moved. Towers thanks to metal hooks can be hanged to a main structure and consequently plugged into the hydraulic system which constantly supply nutrient solution though a dripper. Nutrient solution is then collected on the bottom to ensure a closed loop system and nutrient recycling. A fertirrigation system allows to monitor nutrient solution quality and will be managed directly within the building. The hydraulic system however, will extrude both indoor and outdoor, to easily connect the system when moved outside (In Figure 2, the area dedicated to the outdoor hydroponic production is coloured in grey). Both inside and outside, the metal structure dedicated to hold the ZipGrow towers are designed to be resistant and easily assembled in different way, to ensure different crops needs. Generally speaking, every tower, which is 1,5 m long, will be positioned at 50 cm distance between one another. A 5 meter long metal structure, will allow to hang 10 towers each. Every metal structure will be 1 meter distance from another, to allow staff to easily access plants. The expected number of metal structures is 20, forming an overall productive surface of 100m$^2$ holding 200 towers. A twin structure will be constructed outside, where towers will be positioned from Spring to Autumn, depending on crop status, while a nursery will be established indoor to directly produce plantlets from seed. The crop selected which are better suited for this vertical farming are mainly green leafy vegetables and aromatic plants and have been selected also accordingly to locally produced varieties[7]. Although temperatures and light intensity can be controlled indoor, production of species which requires lower temperatures and light have been scheduled in winter, to reduce energy consumptions and costs.

Leafy vegetables:

- Radicchio di Treviso. Also known as Veneto Lettuce (lattuga veneta), will be cultivated both as an early variety (Precoce) from July to September, and a later variety in winter time. These plants, considering their weight, will be harvested before than usual, at 60 days after transplanting, to produce a lighter and smaller product (150 grams). Spacing is set at 15 cm allowing to grow 10 plants in each column.
- Lettuce. 4 different varieties of lettuce commonly cultivated in North of Italy (*Lactuca sativa* L. var. *capitata*, *Lactuca sativa* L. var. *crispa*, *Lactuca sativa* L. var. *longifoglia*, and *Lactuca sativa* L. var. *angustana*). Plants will be harvested 30 days after transplanting when grown indoor, when they should reach an average weight of 40 grams each. Spacing is set at 15 cm allowing to grow 10 plants in each column. Mostly cultivated from Spring to Autumn.
- Rocket. *Diplotaxis tenuifolia* also known as wild rocket (Rucola selvatica). Spacing is set at 5 cm, allowing 30 plants to grow for each tower. Plants will be harvested at 30 days after transplanting, between February and October.
- Spinach. *Spinacea oleracea* var. Hunter. Resistance to major fungal infection, such as Downy Mildew. Plants will be harvested at 25 days after transplanting, expecting plants of 160 grams each. Grwing period goes from February to October, with the possibility to extend production during winter thanks to the indoor production. Spacing is set at 10 cm, allowing 15 plants to grow for each tower.
- Pak Choi. *Brassica pekinensis* also known as Chinese Cabbage. Plants will be harvested 40 days after transplanting, reaching a weight of 200 grams per plant. Spacing is set at 15cm, allowing 10 plants to grow for each tower.

[3] Schiavon, M. (2010). *Antiche varietà di Mele e Pere del Veneto*. Legnaro: VENETO AGRICOLTURA.
[4] Kenis, M., Tonina, L., Eschen, R., Van der Sluis, B., Sancassani, M., Mori, N. Helsen (2016). Non-crop plants used as hosts by Drosophila suzukii in Europe. *Journal of Pest Science, 89*, 735-748.
[5] Ioratti, C., Boselli, M., Caruso, S., Galassi, T., Grassi, A., Tonina, L., Mori, N. (2015). Approccio Integrato per la difesa dalla Drosophila suzukii. *Frutticoltura*, 6-10.
[6] Leach, H., Moses, J., Hanson, E., Fanning, P., & Isaac, R. (2018). Rapid harvest schedules and fruit removal as non-chemical approaches for managing spotted wing Drosophila. *Journal of Pest Science, 91*, 219-226.
[7] Pimpini, F., Giannini, M., & Lazzarin, R. (1999). *Ortaggi da foglia da taglio*. Legnaro: Veneto Agricoltura.

- Curly Kale. *Brassica oleracea*. Plants will be harvested 40 days after transplanting, reaching a weight of 200 grams per plant. Spacing is set at 15cm, allowing 10 plants to grow for each tower.

Aromatic plants:

Aromatic plants will include both traditional and unusual ones, to stimulate the curiosity of visitors. Spacing separating different groups of seedlings is set at 5 cm if not differently specified, allowing the tower to be almost completely covered. Harvest will be done through apical cutting or hand picking.

- Chive (*Allium schoenoprasum*).
- Genovese Basil (*Ocimum basilicum*). Spacing is set at 10 cm.
- Artic Basil (*Ocimum basilicum*). Spacing is set at 10 cm.
- Red Basil (*Ocimum basilicum*). Spacing is set at 10 cm.
- Mint (*Mentha spicata*). Spacing is set at 10 cm.
- Parsley (*Petroselinum hortense*).
- Coriander (*Coriandrum sativum*).
- Tarragon (*Artemisia dracunculus*).
- Dill (*Anethum graveolens*).

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Radicchio | | | | | | | | | | | | |
| Lettuce | | | | | | | | | | | | |
| Rocket | | | | | | | | | | | | |
| Spinach | | | | | | | | | | | | |
| Pak Choi | | | | | | | | | | | | |
| Curly Kale | | | | | | | | | | | | |
| Chive | | | | | | | | | | | | |
| Basil | | | | | | | | | | | | |
| Mint | | | | | | | | | | | | |
| Parsley | | | | | | | | | | | | |
| Coriander | | | | | | | | | | | | |
| Dill | | | | | | | | | | | | |

*Table 6: Schedule of plants cultivated in the vertical hydroponic system. The table includes both leafy vegetables and aromatic plant*

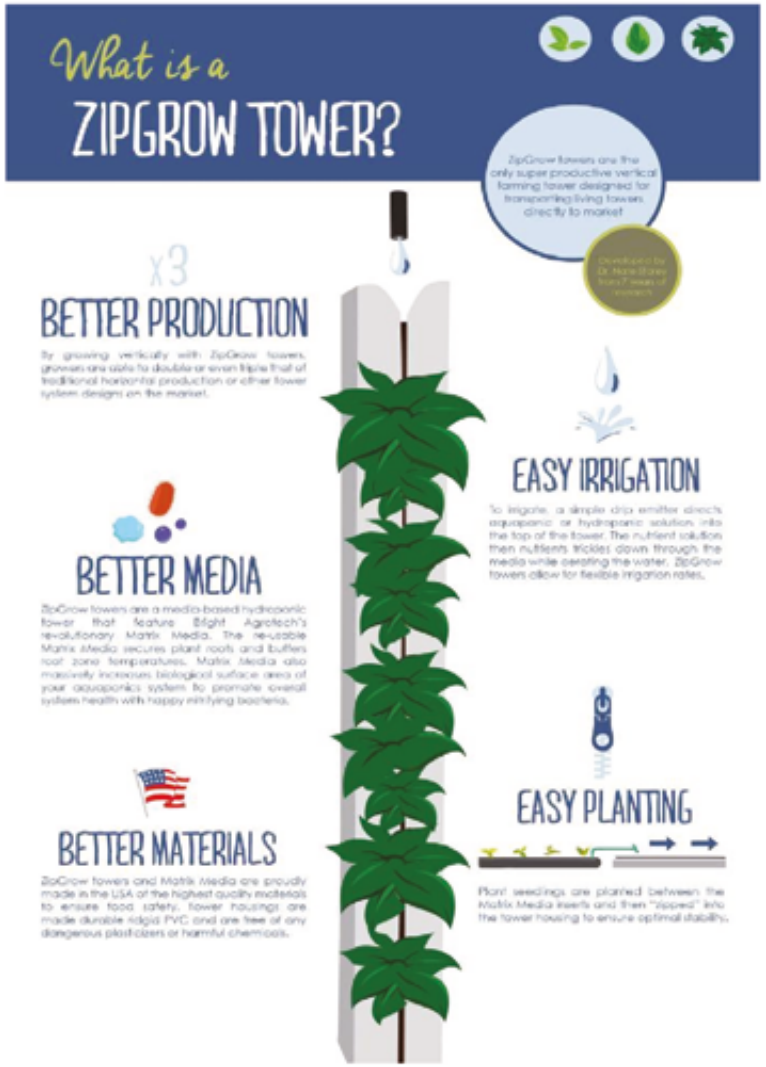



*Figure 41: Drawing explaining the ZigGrow towers developed by Dr. Nate Storey at the University of Wyoming. The drawing represent the main advantages resulting from the use of a ZipGrow system.*

Many are the advantages resulting from this system. First of all, towers can be hanged closely to greatly increase productivity. Thanks to their light weight they can be easily transported and moved in various places, where potentially the final consumer can pick them directly from the column.

## 2.2.2. Brewery

The microbrewery is one of the business idea planned for the area Ex-Zanussi in Conegliano, Treviso. The scenario where the project is proposed is positive in terms of demand: the beer sector today plays a preeminent role in national economy and export and beer has got more and more into the consumption habits of Italians and is an integral part of the Mediterranean Diet. One of the most interesting part of the sector is craft beer that bring thanks to consumers being ever more curious and better-educated regarding the product. The sector of craft beer recently had a real boom. Indeed, after the birth, all over the country, of new entrepreneurial businesses, mostly led by young people, today microbreweries are over 850, mostly concentrated in Lombardia (134), Piedmont (80), Veneto(74) and Tuscany(63). The market reveals: young, chaotic and far away from his maturity. [8]

The microbrewery aim is contributing to the sustainable regeneration and development of Ex-Zanussi, through the endorsement of natural and human resources. As contextualized in the overall project of Gilgamesh, the microbrewery has a double-purpose: production and education. The main investments of the microbreweries are related to machinery acquisition for the production and packaging of beer. The brewery systems selected is TANKER model delivered by BBC INOX srl, Possagno (TV). The system is characterised by high performance, ergonomic and equipped with an easy and intuitive software that allow the control over all the production. The TANKER model provides an heat exchanger for rapidly decreasing of the temperature in the system through the use of water production. The hot water (more than 75 C T) obtained is re-circulated in the system for a new process of beer production and thus decreasing the cost of production considerably.

The short-term objective is achieving an operatively positive result of 60.000 euro through the optimal use of finance and human resource. The forecast of production is 1.133 bottles in the first year, for a total amount of 408 Hectolitres, and the recruitment of two employer, brew-master and one worker. The educational process will embrace the different stage of the process providing different course linked with beer production and tasting. The aim of the educational process is giving an additional value to the location and product making easier the process of project diffusion in the city. To achieve these objectives has been developed an efficient communication strategies that enlighten the peculiarity of the product and thus secure customer loyalty in Conegliano city. The main objective for the middle and long term is consolidate the turnover to cover the fix cost and guarantee a living wage for the employer. These two objectives will be achieved with an increment of revenues through amplification and diversification, either of product and services, allowing to a better positioning in the craft market in Conegliano and in the region of Veneto. The amplification of the production will be achieved through the system of "doppia cotta" leading to the increase of until 1224 HL in the fourth year. Barley Wine, aged beer, and Fruit beer, Lambic style beer refermented with the addiction of local fruit varieties grow in the soilless thematic park, are the main strategies for the production diversification of the production in order to achieve higher price and achieve different target of the market.

## 2.2.3. Greenhouse for mushrooms

The idea of the project is the establishment of learning and production center inside the Ex-zanussi area of 200 Mq. Mushroom is an exotic and nutritious source of vegetarian food. It is a major horticulture product all over the world and is also becoming popular in Italy. It contains many vitamins and minerals but very low on sugar and fat. It can be grown in a temperature between 20 and 30 C and required relative humidity is 55 to 75%. Many examples of mushroom production within the city are available in Europe. RotterZwan[9], La Caverne[10], Bunker comestible[11] are just few examples of successful stories on the production of mushroom in the urban and sub-urban area. As the project is inside GILGAMESH, two main activities will be delivered inside the area: production and learning activities. The learning activities will be delivered by the personal that works inside the project and will play a crucial role in the creation of the brand inside the city of Conegliano. At the beginning of the project two main product will be provided: fresh mushroom and canned mushroom. These two products will ensure the minimum of waste of the production as fresh mushrooms have very limited shelf-life but dried and packed mushrooms have considerable shelf life. The variety selected is the Pleurotus ostreatus, so called oyster mushroom, a common edible mushroom. Oyster mushrooms are easy to cultivate and process and do not require huge investment. Hence, this note deals with cultivation and processing of oyster mushrooms. The objective of the first year is achieve an income of 33,780 Euro and in the second year 42,767 Euro covering the fixing cost and the salaries of four people (1 skill personal,2 helpers and 1 salesman) following the concept of living wage. The long-term objectives are based on the principle of differentiation and amplification of the production thanks to the experiences and the better knowledge of the market.

Mushrooms are grown in wooden trays or boxes of 100 cm x 50 cm x 15 cm piled up. They are filled well with the compost and pressed firmly leaving 3 cm clear space on top of the tray. The grain spawn is scattered on the surface of the compost which is then covered with a thin layer of compost. After that the trays are covered with old newspaper sheets and water is sprayed to provide humidity. The trays are then stacked vertically. At a temperature of around 24 - 25 C white cottony mycelium spreads and permeate through the compost. It takes around 12 to 15 days for the complete spawn running. Ultimately, the surface of the compost is covered with half to one inch level of casing soil. It is sterilized to kill insects, nematodes and molds. The casing soil is spread over plastic sheets and treated with formalin and stirred frequently for a week to remove formation fumes. After casing, the temperature has to be maintained at 24-25 oC for 3 days after which it must be lowered to 18 oC. Thus, batches of trays must be arranged in such a way that there is a regular daily production.

The production of mushroom will be added in the cycle of input and output established within the project GILGAMESH (Figure 3). Indeed, the by-product of the brewery process will be included inside the substrate for the mushroom production and the exhausted substrate will be used as natural fertilizer for the orchard in the thematic soilless park. For successful cultivation, careful attention has to be paid to three aspects viz. good compost, reliable spawn and right temperature during growing period or else partial or complete failure of the crop may result. Natural compost is prepared from spent brewery grain (10%), wheat bran (20%), beech sawdust (68%) and Calcium carbonate(2%). According to Andrej Gregori et al.[12] this compost has been tested for the cultivation of Pleurotus ostreatus and resulted the fastest mycelium growth substrate. In the other hand, in a recent article from "L'Informatore agrario", important agriculture newspaper, reported the positive results of the application, previous pasteurization and sterilization, in the soil as mineral improver.[13]


*Figure 42: Drawing explaining the concept of input re-utilisation in three different process within GILGAMESH project*

[8] AssoBirra, final report 2018
[9] https://www.rotterzwam.nl/
[10] https://lacaverne.co/
[11] https://magazine.laruchequiditoui.fr/bunker-comestible-lagriculture-fleur-fusil/

[12] Andrej Gregori, M. S. (2008). The use of spent brewery grains for Pleurotus ostreatus cultivation and enzyme production. PubMed, New Biotechnology 25(2-3):157-61.
[13] Valentina gobbi, C. N. (2015). Substrato di fungaia, efficace fertilizzante alternativo. *L'Informatore agrario*, 22.

# City/district functionality

## Overview

Cities are an essential platform for communication, interaction, creativity and innovation, however, the relation between humankind and cities has always been a double-edged sword. As a result of industrialisation, the overexploitation of natural resources and unsustainable land use, cities face rising temperature and sea levels, natural disasters and extreme levels of pollution. Cities consume more than half of the world's energy and cause over 70% of global anthropogenic greenhouse gas emissions. At this critical crossroads, it is essential to benefit from the creative and innovative power of cities in responding to these challenges and exploring the value of nature as a part of the solution in combatting climate change and its impacts.

Not only vital for the world's major capital cities, it is also vital for small and medium-sized cities, to have a platform for exchange, as they are equally important in creating sustainable change: in this project we present an innovative approach in a nature-based solutions to respond to a range of challenges in their cities, and to meet national, as well as global sustainable development goals. These cities understand that nature-based solutions adapted to their unique local context, are highly valuable in fighting climate change impacts and improving quality of life for their citizens.

Many cities are already active in improving their green footprint and creating a more sustainable attitude for future development by cutting emissions, using renewable energy and reducing pollution. However, we need to think further. Now, more than ever, there is a need to reconnect with and integrate nature in the urban fabric. Nature-based solutions are actions to protect, manage, and restore natural or modified ecosystems(link is external) that aim to support addressing society's challenges in sustainable ways. Nature-based solutions are a new and largely untapped opportunity for cities to obtain not only ecological but also social, economic and health benefits. By delivering multiple co-benefits through enhanced ecosystem services, such as air and water quality and biodiversity, climate mitigation and adaptation, jobs and economic opportunities, nature-based solutions are crucial to increase the quality of life in urban areas.

## Stakeholder analysis

| STAKEHOLDERS | INVOLVMENT | BENEFITS |
|---|---|---|
| Local community | Brainstorming | Regenerated area enjoyment |
| Disadvantaged people | Activities commitment | Integration in the society and education |
| Customers | Buying urban farm products | Healthier diet |
| Public Institutions | Urban regeneration | Citizens appreciation |
| Investors | Economic contribution | Economic and reputational benefits |
| Suppliers | Know- how | Revenues opportunities and trained human resources |
| Universities and students | Idea generation | Students attractiveness and reputation |

- **Local community**

The Zanussi area, also called "The black eye of Conegliano", has an emblematic meaning always meant a lot for the local community:, in fact, it is the symbol of the economic growth started in the '60. For this reason, its upgrading has to take into account Conegliano citizens will and needs. Unfortunately the area, which is one of the most unattractive places of the district, is very closed to the city centre.
In this regard, the redevelopment of the building will allow the increase of the positive externalities in lifestyle level of the neighborhood: the visual impact will be reduced to the benefit of all the inhabitants of the area.
Moreover, In this regard, once it will be upgraded the local community will have, firstly, the opportunity to enjoy the area as a Green zone, to walk, jog and chill-out. Secondly, the area will host an internal structure: the spaces not reserved for productive activity of vegetables and plants the part that will not host the vegetables and plants production, could be used as a multifunctional space. The internal building, in fact, it is thought to be a very flexible space, with mobile walls and adaptable furniture in order to be arranged for any possible usage. The citizens will have the possibility to book the internal space for public and private events such as birthday parties, meetings... Finally, the local community is invited to participate to the agri-food park activities as frequent visitor and workshop participants or simply as customers of the park products (vegetables, mushrooms, beer).
Obviously, the local community will be involved in the discussion to plan the details of the project because is important to take into account the desires of who lives the area in the foreground.

- **Disadvantaged people**

The courses that will be hosted in the internal spaces of the area are mainly intended for disadvantaged social categories as immigrants, people with disabilities and ex-cons. These categories present higher risk of marginalization in our society that is directly translated into unemployment. Since integration wrongly pass through welfarism a real inclusion is never achieved. Real integration in the society for disadvantaged categories could be achieved only by the provision of some tools that allow them to be self-sufficient. The idea is not simply to offer a job to the classes with higher risk of social exclusion, but to provide education in the field of plant production and managerial skills. The teaching process will be characterized by a learning by doing approach. With this practical way of teaching the learners become at the same time students and resources of the urban farm establishing a win-win situation.

- **Customers**

Customers of the urban farm will have the opportunity to buy and and include in their diet biological, local vegetables and fruits. According to the Cambridge Journal of Regions, Economy, and Society, that studied 3,060 counties in the U.S, found out that counties with a higher volume of local businesses actually had a lower rate of mortality, obesity, and diabetes. It's simple: eating foods that are unadulterated with pesticides like organic fruits and vegetables, contribute to a huge upgrade in the Standard American Diet (SAD.) Farm-to-table food provides not only health benefits but also tastes better and lasts longer. Buying local is becoming more and more important for responsible citizens that try to reduce their environmental impact in their habitual actions. Indeed, local food means using less plastic for packaging and reinforces the BYOB (bring your own bag) habit. Moreover, local food reduces fossil fuel used in transportation. Finally, buying local means less risk for food contamination. In fact, large industrial settings often breed risk to foodborne illness, as E.coli in bagged spinach. As mass produced foods possess a greater threat to becoming tainted, local food is fresher and usually safer.

- **Public institutions**

Public institution will represent the main contributor of the project. Since many years citizens are asking to local institution to take charge of the area Zanussi issue. Local authorities will gain the appreciation of the local community that asked for many years for an intervention in the ex-smelter area.
At the macro level institutions could take credit for improve the citizens lifestyle in terms of nutrition and pollution reduction. Promoting local market, could make a world of difference in limiting the use of fossil fuels. Indeed, the energy used to bring food to our table contributes to global warming and unhealthy air quality, with the release of almost 250,000 tons of global warming gases attributed to the imports of food products.

- **Investors**

As a result of a deep analysis of the opportunities that the project offers and following an accurate risk assessment, it will not be difficult to find investors who belive in the success of the project. Investors could be found in the following areas:

- *Crowdfunding:* a great tool for creative and artistic projects. The attractive idea could be launched on special portals (like kickstarter.com, bancomail.it..), and people will be invited to finance with small shares, recognizing the participation with materials and gadgets.
- *Facilitated finance:* opportunities of direct financing, with disbursement of money, or indirect, through tax incentives or guarantees on the financing obtained from banks and financial institutions, included non-refundable contributions. A constant and continuous search for opportunities to access facilitated finance tools will be undertaken by the actors involved, in order to monitor the sites of public (European Commission, Ministries..) and private administrations (banks, credit institutions..), able to support the project.
  Investors will obtain the advantage to can be some of the proponents of this singular activity, allowing a return in image related to the dissemination and visibility of their business.

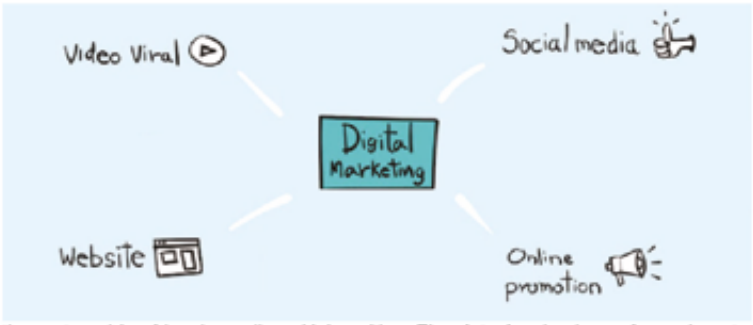
- **Suppliers**

Local SME's are fundamental for the pragmatic success of the project. SME's are driver that guarantees project to settle in an unknown environment. , therefore their contribution to the analysis of opportunities and threats of the surrounding environment allows a successful synergy. Local businesses active in the nursery sector, substrate production, fertirrigue solutions, packaging and HoReCa will become active partners of the urban farm project. . , . Indeed, we are confident that the interaction with local suppliers will .allow to share know-how and the knowledge of the reference context. The social network is necessary also to proceed with the adoption of a virtuous project, autonomous in achieving economic sustainability, as well as environmental and social sustainability . The synergy created will allow companies to have new customers and greater awareness, given the strong use of marketing levers in the project and the important singularity that the project covers in the national context. Moreover, the possibility to create an experimental center characterized by a constant interaction with students and academics will allow at the same time a lucky exchange of know-how and a wide margin of improvement of the products and services offered on the market by the local businesses.

- Students: Students will have the possibility to be involved in a very international and highly innovative project . Experimental courses will be organized for the students' development of practices in the phases of production and transformation, with the dual objective of learning the processes, but also experimenting with new research themes. The possibility of gaining experience in the new establishment will also allow students to develop know-how and consequently tighten the link between university and market labour.
- Universities: The success of the project will guarantee to the universities involved a huge advantage. Although, Italian universities have always been considered excellent in teaching pure basic research, students suffer from a lack of practical and entrepreneurial skills. This new vision of the university context will attract new members and greater appreciation in terms of student involvement, undertaken by new projects and research activities.

## Marketing Plan

GILGAMESH marketing plan is developed in order to bring more awareness to the project especially among the identified stakeholders. First of all, GILGAMESH project will have its own website. Storytelling will be the major tool to communicate the story of the ex-smelter from its creation until the regeneration into an urban farm. Secondly, we certainly require all social media accounts such as Instagram which is the most used now. Finally, GILGAMESH will exploit the sponsorship of the local administration and the partnership of local suppliers, Universities, Fine Arts Academies, refugees' centers and restaurants.

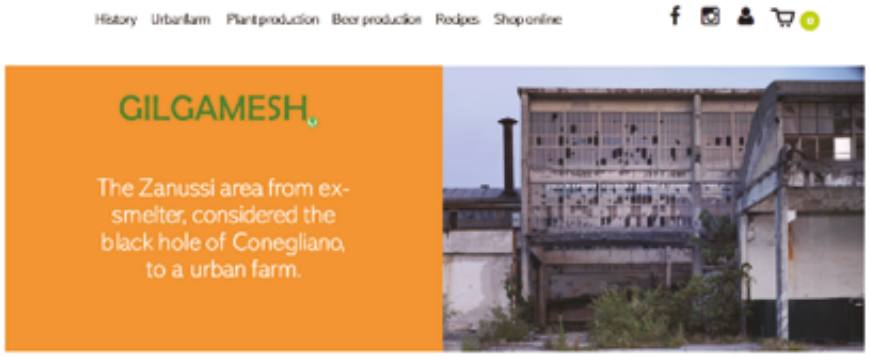



The **website** should present the story of the ex-smelter using storytelling. The area has an emblematic meaning for the local community as it represented the center of the economic growth of the district. For this reason, we would like to recall in the website its history and its strict connection to the community.

The idea is to include in the website some videos showing the production of beer and plants. The **videos** have the intent to show the techniques used in the farm not only to communicate to the final clients but also to share knowledge.

The recipes section will be filled periodically depending on the season with some traditional recipes to inspire our vegetables customers. In a second moment we would like to add the possibility to order the shopping online and to have it directly delivered at home or in the office of our clients. The recipes and the online shop are useful tools to create and maintain a good customer relationship.

GILGAMESH website FrontPage:




The use of **social media** is central; GILGAMESH will be present on Facebook and Instagram. Facebook used to connect real time with our clients and stakeholders while Instagram, as valuable visibility, will be used especially as a communication tool. Instagram is useful to create the urban farm image in the social world. The idea is to create a social marketing campaign using Instagram stories to report and follow the area regeneration from the beginning to the opening. This campaign will be helpful to create expectation and involvement in the project.

Once the urban farm will be set up the idea is to maintain client's relationship with **promotions** on fruit, vegetables and beers. On the other side, **sponsorship and partnership** will be useful to maintain stakeholder's connection. We identify as our possible partners: local suppliers, schools, refugees' centers; local restaurants; Accademia belle Arti di Venezia while the main sponsor will be the local administration.

For instance, the idea is to create a long-term collaboration with local **schools**. Students together with their teachers will have the possibility to visit the urban farm and to experience the state-of-art production techniques used in the farm.

## Competitor Analysis

Competitive analysis is a strategic research that specializes in the collection of information about rival firms. In the case of a regeneration project, it is not correct to talk about competitors, however, as the project aspiration is the became sustainable economically is important to have an idea of possible competitors.

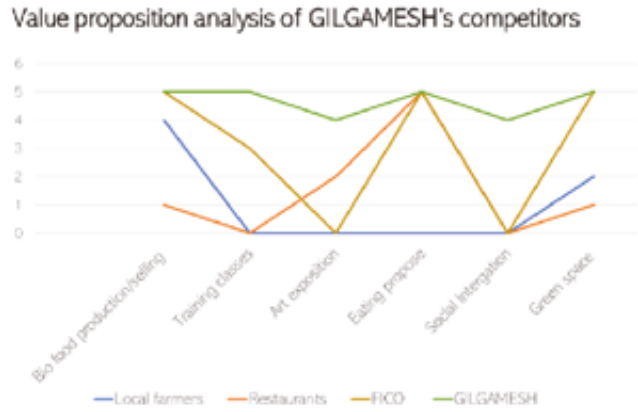
We have identified local farmers as our first competitors, even though the urban farm core business is not vegetable production and selling. On one side, we differentiate from local farmers as the farm beer and vegetables production are mainly tools to spread education and knowledge. On the other side, the urban farm will offer the possibility the its clients to buy online and have the order delivered at home or in the office. Finally, as the farm is closed to the city center, urban farm customers will have the opportunity to be directly involved in the vegetables production.

**FICO- Fabbrica Italiana Contadina**, the Italian Farming Factory could be wrongly considered our competitor as we share the same educational experience about food production. However, our class we be focused on the products we really are going to produce, and the training is especially thought for disadvantaged people that are willing to have an education not only in the field of food production but also in managerial skills. In addition, the urban farm produces beer apart from vegetables and mushrooms. We also differentiate as the green area will be freely accessible to public, in fact, our primary aim is to offer a green space to the local community. At last, our farm will offer the union between art and nature that FICO doesn't have.

We have planned the creation of an internal **restaurant.** We believe that the restaurant inside the urban farm will be appreciated as it will cook only the products produced in the farm. Moreover, the restaurant area will be decorated with artworks that will change periodically. Our customers will have the possibility to enjoy the artworks while eating and to buy them if they wish. For this reason, we have identified also **restaurants and art galleries** among our main competitors.

In the following graph is shown GILGAMESH and its competitors value propositions. GILGAMESH project is represented by the green line, and its strongest point compared to FICO, the yellow line, are the union between art and nature, as well as, the social integration of disadvantaged people.

Although restaurants might have a lovely furnishing, they do not offer, as GILGAMESH does artworks view. Moreover, restaurant clients will have the opportunity to enjoy the farm green space, more suitable for family lunches.




### 4. Economic feasibility and sustainability including Business Model

The project aims to achieve sustainability under the three different challenges: the social, the environmental and the economical one. The set of planned plant and production costs and the related revenues are described below, in order to assess the economic advantage of the intervention. The economic analysis was obtained by evaluating the necessary restructuring costs and production costs and revenues for each type of area.

The following will therefore be reported:

1. Redevelopment costs;
2. Brewery costs and revenues;
3. Mushrooms costs and revenues;

4. Costs and revenues of soilless cultivation;
5. Outdoor costs and revenues;
6. Costs and revenues of transversal initiatives.

## 1. Redevelopment costs

The following table describes the costs of redevelopment:

| REDEVOLPMENT COSTS | |
|---|---|
| 1. feasibility study | 10.000,00 € |
| 2. isostatic study | 15.000,00 € |
| 3. removal of cement | 140.000,00 € |
| 4. adaptation of the supporting structures | 1.125.000,00 € |
| 5. adaptation of support structures | 700.000,00 € |
| 6. reconstruction of electrical and water supply systems | 150.000,00 € |
| 7. optical fiber | 70.000,00 € |
| 8. ancillary works | 40.000,00 € |
| ***TOTAL*** | ***2.250.000,00 €*** |

As will be described in the following parts, the quotas included in the table will be charged in the analysis of the costs and revenues of the various key areas.

| Amortization | |
|---|---|
| Building renovation costs | 2.250.000,00 € |
| Duration (years) | 30,00 |
| Amortization fee | 75.000,00 € |

| Distribution of annual amortization between the key areas envisaged by the project | | |
|---|---|---|
| Key - area | % of attribution | Amount |
| Brewery | 25% | 18.750,00 € |
| Soilles cultivation | 25% | 18.750,00 € |
| Mushroom production | 25% | 18.750,00 € |
| Outdoor activities | 10% | 7.500,00 € |
| Other activities | 15% | 11.250,00 € |
| Total | 100% | 75.000,00 € |

## 2. Brewery costs and revenues

The following table describes the expected costs linked to the birrification activity:

| BREWERY | |
|---|---|
| MACHINERY PLANTS AND EQUIPMENT | |
| Basic tanker system (5 Hl) | 54.000,00 € |
| COMBI-TANK for double tank (12 Hl) | 125.925,00 € |
| tino boiler increased by double tank | 7.300,00 € |
| Scrambler | 4.965,00 € |
| Mill | 2.400,00 € |
| Refrigerating machine | 6.900,00 € |
| Magnetic flow meter | 1.950,00 € |
| Trolley pump | 900,00 € |
| ACCESSORIES | |
| Linear filler ( 6 outputs) | 1.950,00 € |
| Pneumatic capping machine | 580,00 € |
| Semi-automatic labelling machine | 4.150,00 € |
| Stainless steel table for packaging | 1.100,00 € |
| Oxygenation kit must | 1.100,00 € |
| management of fermentation | 5.300,00 € |
| ***TOTAL*** | ***218.520,00 €*** |
| Brewery amortization | |
| Equipment cost | 218.520,00 € |
| Duration (years) | 15,00 € |
| ***Amortization fee*** | ***14.568,00 €*** |

Before proceeding with the analysis of costs and revenues, it should be noted that the data and figures considered must be considered net of the I.V.A and transport costs. The "Gilgamesh" microbrewery project shows the costs necessary for the launch of a craft brewery company and the relative wholesale sale through drums and bottles.

The tables describe the trend of revenues and costs in the brewery, a structure that guarantees wide margins of profit. Specifically, the costs that impact on production are the labor used in the production process (90.000,00€) and the raw materials used, of first choice. Furthermore, costs also include the calculation of depreciation rates. The production errors adopted consist in the diversification of production: 6 beers were chosen (Bitter Ale, Bock, Weizen, Spelt and Special) that are sold internally to the factory but also to local markets. The remuneration of the brewery is high.

| Costs and revenues (122.400 L of beer) | | | | | |
|---|---|---|---|---|---|
| Costs | | Revenues | | | |
| | | *Typology* | *Quantity (L)* | *Price* | *Total* |
| Water | 1.100,00 € | Bitter Ale | 30000 | 5,80 € | 174.000,00 € |
| Hop | 12.000,00 € | Bock | 24600 | 6,00 € | 147.600,00 € |
| Yeast | 5.000,00 € | Weizen | 23200 | 4,00 € | 92.800,00 € |
| Malt | 45.000,00 € | Spelled | 11300 | 4,50 € | 50.850,00 € |
| Excise | 42.660,00 € | Special | 33300 | 5,20 € | 173.160,00 € |
| Energy | 50.000,00 € | Total | 122400 | | 638.410,00 € |
| Detergents | 20.000,00 € | | | | |
| Labor full time | 65.000,00 € | Profit | | | |
| Labor part time | 25.000,00 € | | | | |
| Building amortization | 18.750,00 € | Total revenues | | | 638.410,00 € |
| Machinery amortization | 14.568,00 € | Total costs | | | 299.078,00 € |
| ***TOTAL*** | ***299.078,00 €*** | Operating profit | | | 339.332,00 € |

## 3. Mushrooms costs and revenues

Below are the described the construction costs to support the mushroom production greenhouse. Also in this key area, the amortization table was constructed in order to impose a depreciation rate for the first 5 years, following which it will be necessary to provide for a reorganization of the structure.

| MUSHROOM GREENHOUSE | |
|---|---|
| **MACHINERY PLANTS AND EQUIPMENT** | |
| Tray-type Dehydrator | 2.400,00 € |
| Steam-jacketed Kettle | 2.200,00 € |
| Can Steamer | 680,00 € |
| Blanching Equipments | 845,00 € |
| Straight-line exhaust box with electric motor | 1.550,00 € |
| Canning Retort with Attachment | 1.200,00 € |
| Stackig Trays | 500,00 € |
| Baby Boiler | 2.000,00 € |
| Laboratory Equipments | 1.500,00 € |
| ***TOTAL*** | ***12.875,00 €*** |
| **Amortization** | |
| Equipment cost | 12.875,00 € |
| Duration (years) | 5 |
| ***Amortization fee*** | ***2.575,00 €*** |

The costs estimated below will allow, even in this case, to succeed in a positive return. In fact, a profit of € 48,875.00 is expected, deriving from the production and processing of mushrooms (preserves, sottoli..). The cultivated leaves have been chosen taking into account the reference market: Pleurotus eryngii, Champignons and Shiitake.

Experimentation activities will be foreseen to find substrates at no cost, in order to optimize the operating profit and contribute to the circularity of the processes: the production cycle of the mushroom, in fact, lends itself well to the exploitation of waste: think for example, to the inoculation of the substrates composed of the mocha.

| Costs and revenues (30 T of mushrooms) | | | | | |
|---|---|---|---|---|---|
| **Costs** | | **Revenues** | | | |
| Structure (glass, plastic) | 6.000,00 € | *Typology* | *Quantity (L)* | *Price* | *Total* |
| Support structure soilles coltivation | 800,00 € | Pleurotus eryngii | 20000,00 | 5,00 € | 100.000,00 € |
| Boiler | 4.000,00 € | Champignons | 7500,00 | 3,50 € | 26.250,00 € |
| Mushrooms Spawn | 10.000,00 € | Shiitake | 2500,00 | 4,10 € | 10.250,00 € |
| Spore of pleurotus | 8.000,00 € | Total | 30000,00 | | 136.500,00 € |
| Shading sheets | 4.500,00 € | **Profit** | | | |
| Labor full time | 23.000,00 € | | | | |
| Labor part time | 10.000,00 € | | | | |
| Building amortization | 18.750,00 € | Total revenues | | | 136.500,00 € |
| Machinery amortization | 2.575,00 € | Total costs | | | 87.625,00 € |
| ***TOTAL*** | ***87.625,00 €*** | **Operating profit** | | | 48.875,00 € |

## 4. Costs and revenues of soilless cultivation

| SOILLESS CULTIVATION | |
|---|---|
| **MACHINERY PLANTS AND EQUIPMENT** | |
| Zip Grow Tower | 20.000,00 € |
| Zip Grow Structure | 25.000,00 € |
| Hydroponic system complete | 95.700,00 € |
| ***TOTAL*** | ***140.700,00 €*** |
| **Amortization** | |
| Equipment cost | 140.700,00 € |
| Duration (years) | 5 |
| ***Amortization fee*** | ***28.140,00 €*** |

Soilless cultivation will be the main source of income for the project, as well as the activity that will most involve the social in the implementation of the project. In line with the vision, in fact, numerous courses will be activated to bring citizenship closer to protected cultivation: training and experimentation will accompany the entire life of the Gilgamesh project.

Despite the high initial investment costs, the value of production increases the production of the cultivation process.

| Costs and revenues (soilless cultivation) | | | | | |
|---|---|---|---|---|---|
| **Costs** | | **Revenues** | | | |
| Submersible water pump (800 GPH) | 50,00 € | *Typology* | *Quantity (L)* | *Price* | *Total* |
| Tubing syste, | 200,00 € | Lettuce | 25899,00 | 2,00 € | 51.798,00 € |
| Leafy vegetable and aromatic seeds | 960,00 € | Basil | 21345,00 | 5,00 € | 106.725,00 € |
| Utilities (electricity) | 5.167,27 € | TOTAL | 47244,00 | | 158.523,00 € |
| Utilities (water) | 125,74 € | **Profit** | | | |
| Labor full time | 23.000,00 € | | | | |
| Labor part time | 10.000,00 € | | | | |
| Building amortization | 18.750,00 € | Total revenues | | | 158.523,00 € |
| Machinery amortization | 28.140,00 € | Total costs | | | 86.393,01 € |
| ***TOTAL*** | ***86.393,01 €*** | **Operating profit** | | | 72.130,00 € |

## 5. Outdoor costs and revenues

Around the plant, a green area will be built as an orchard. The high maintenance needs that will be required by the green will be completely absorbed by the associations of "collective agriculture" that will be managed by the structure's representatives. In this way, therefore, the area will not only be used for production, but, above all, will have a socio-cultural vocation in the urban context of reference.
An App will make outdoor cultivation activities attractive, providing the challenge among the members of the Gilgamesh project. There will be challenges related to production, pruning speed and harvesting, as well as functions such as "Adopt your tree". There will be numerous bonuses, which can be spent in the company, to those who will take care of the collective areas outside the plant.

| Costs and revenues (soilless cultivation) | | | | | |
|---|---|---|---|---|---|
| **Costs** | | **Revenues** | | | |
| Apple tree | 3.555,56 € | *Typology* | *Quantity (L)* | *Price* | *Total* |
| Cherry tree | 2.750,00 € | Apple | 8889,00 | 1,50 € | 13.333,50 € |
| Fig tree | 866,67 € | Cherry | 4125,00 | 10,00 € | 41.250,00 € |
| Manure | 4.000,00 € | Figs | 6500,00 | 4,00 € | 26.000,00 € |
| Flowers | 200,00 € | TOTAL | 19514,00 | | 80.583,50 € |
| Utilities | 338,00 € | **Profit** | | | |
| Labor part time | 10.000,00 € | | | | |
| Building amortization | 18.750,00 € | Total revenues | | | 80.583,50 € |
| Machinery amortization | 7.500,00 € | Total costs | | | 47.960,23 € |
| ***TOTAL*** | ***47.960,23 €*** | **Operating profit** | | | **72.130,00 €** |

## 6. Costs and revenues of transversal initiatives

The transversal activities will guarantee the assiduous participation of citizens in the Gilgamesh project. The collective fruition is based on numerous collective activities that will guarantee the frequency of the ex-Zanussi factory to all age groups: children, students, the elderly, people tired from the gray daily routine.

| Costs and revenues (other activities) | | | |
|---|---|---|---|
| **Costs** | | **Revenues** | |
| Chancellery | 8.000,00 € | Educational activities | 75.000,00 € |
| Communication | 25.000,00 € | Artistic & recreational activities | 75.000,00 € |
| Various equipment | 7.500,00 € | Total | 150.000,00 € |
| Hospitality for artists | 27.000,00 € | **Profit** | |
| Readings | 8.000,00 € | | |
| Teachers | 10.000,00 € | Total revenues | 150.000,00 € |
| Human resources | 60.000,00 € | Total costs | 145.500,00 € |
| ***TOTAL*** | ***145.500,00 €*** | **Operating profit** | **72.130,00 €** |

Layout



Gilgamesh Urban Farming Project – Correggiano, Ex-Zanussi area

Figure 2

Figure 3

Urban Farming 2019 student competition Team number: 1349

Figure 4

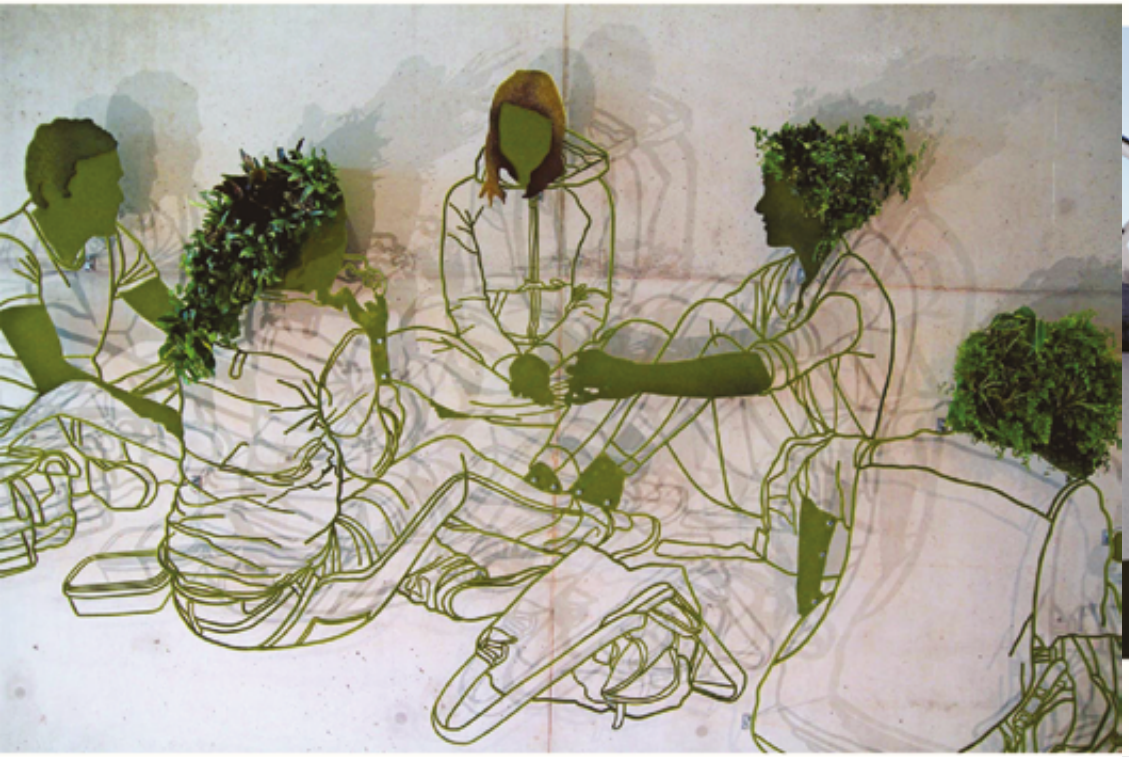
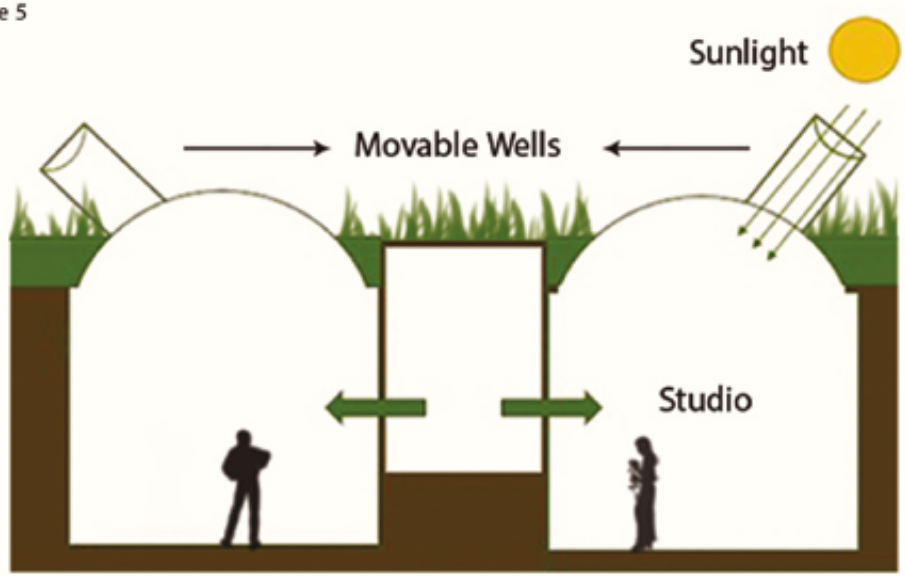


Figure 5




Source: Team work



Gilgamesh Urban Farming Project – Correggiano, Ex-Zanussi area

Figure 6

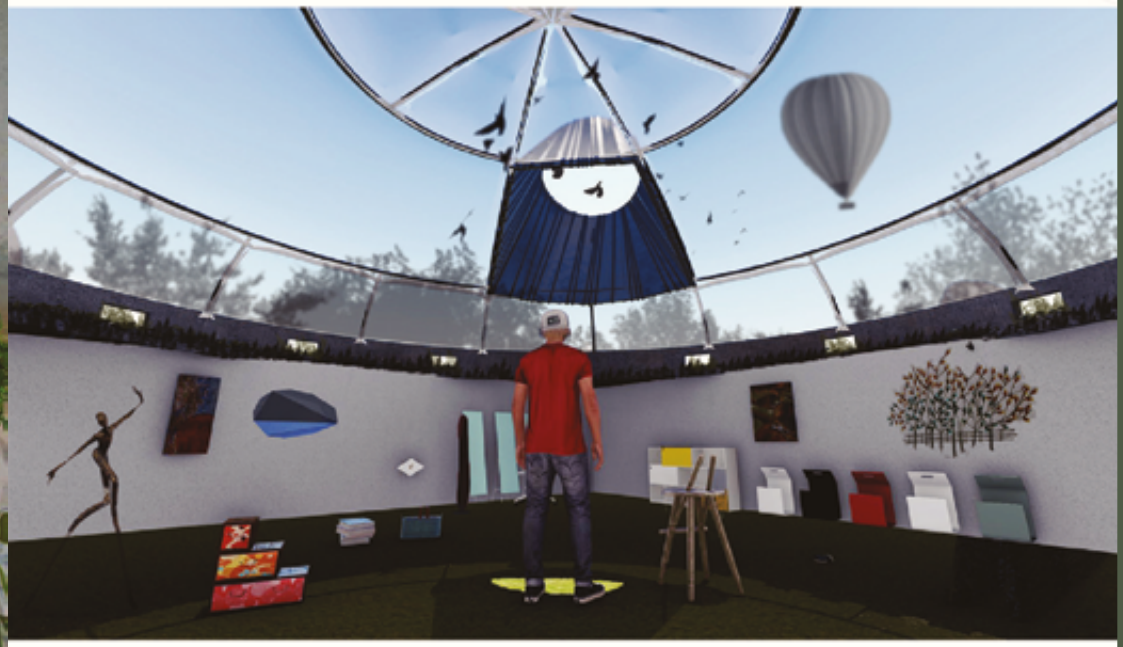


Figure 7

Urban Farming 2019 student competition Team number: 1349

Figure 8

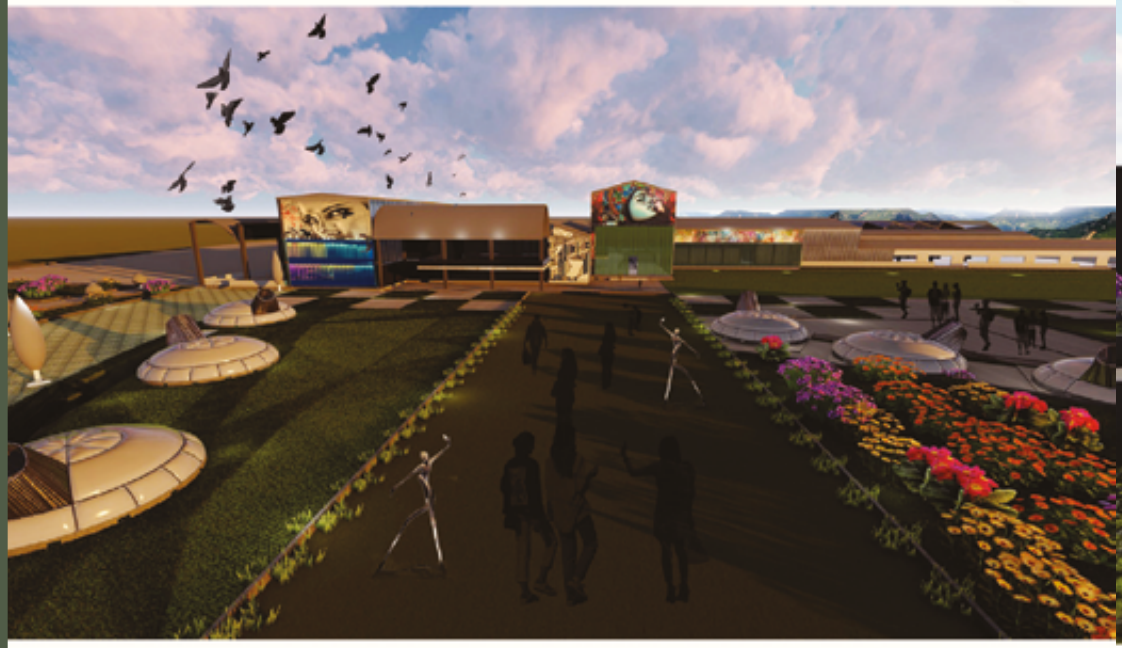
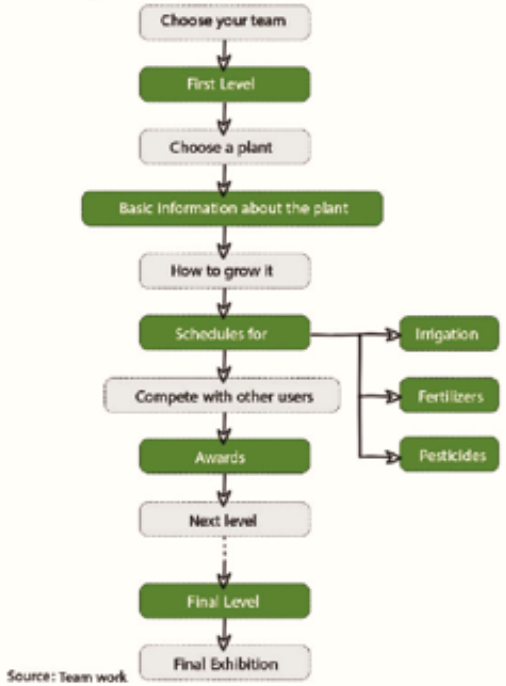


Figure 9

Figure 10



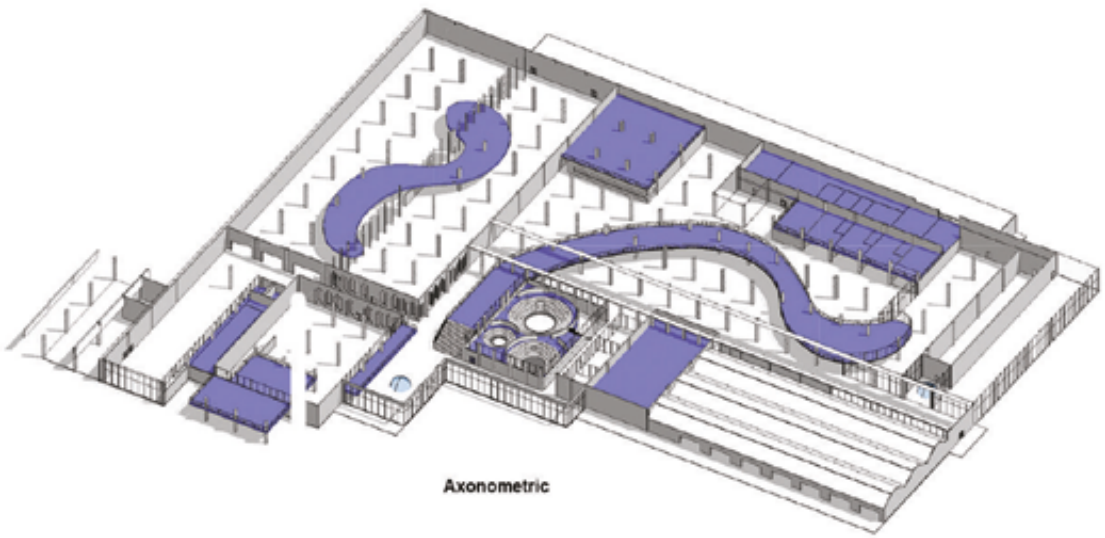

Source: Team work

Gilgamesh Urban Farming Project – Conegliano, Ex-Zanussi area

Figure 11

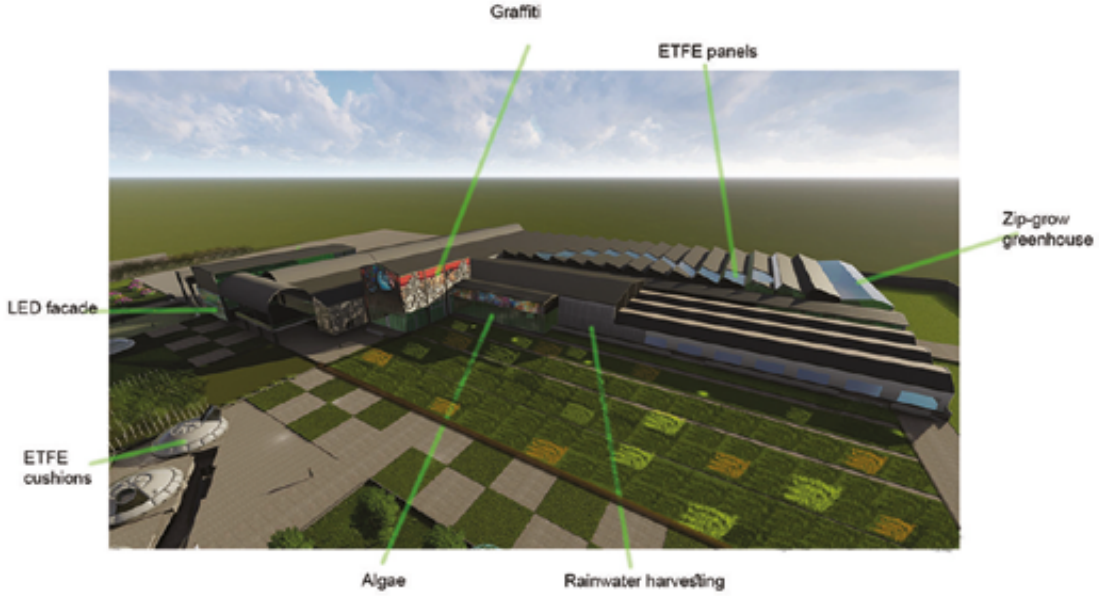
# Gilgamesh

Figure 22



Axonometric

Figure 39






Gilgamesh Urban Farming Project – Correggiano, Ex-Zanussi area

Figure 19

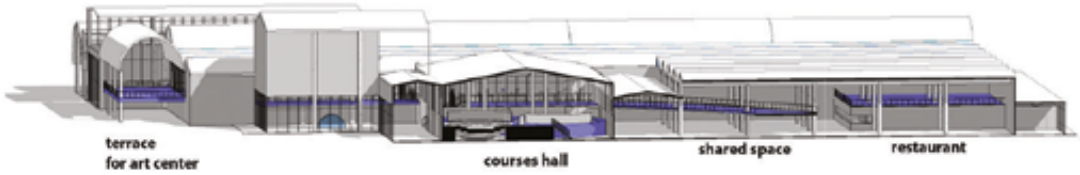
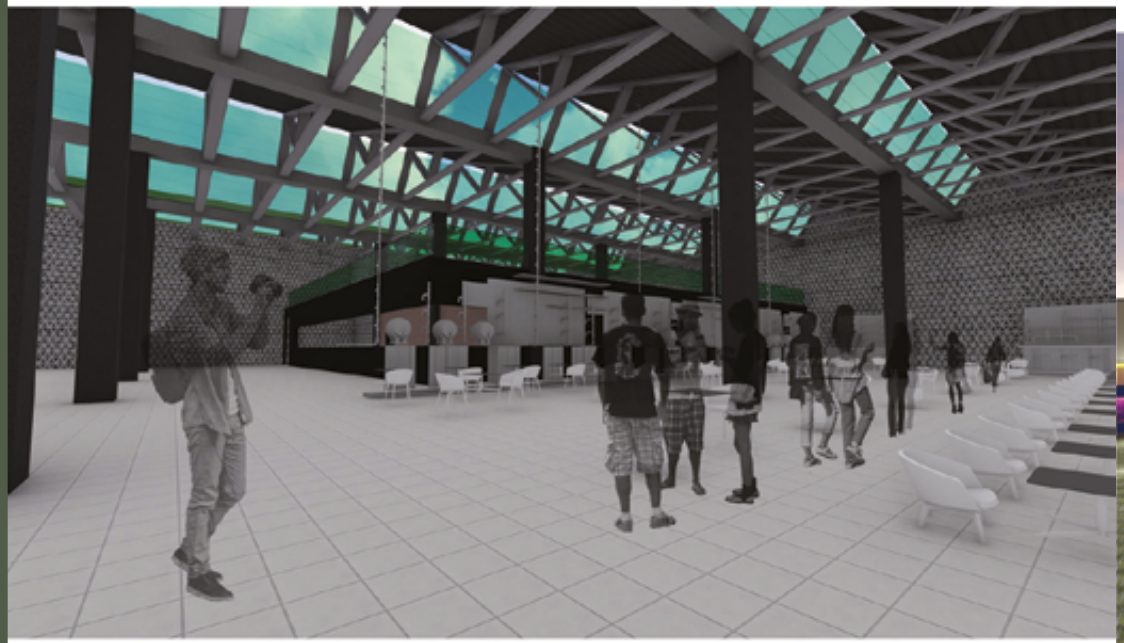



Figure 20

# Gilgamesh

Figure 17

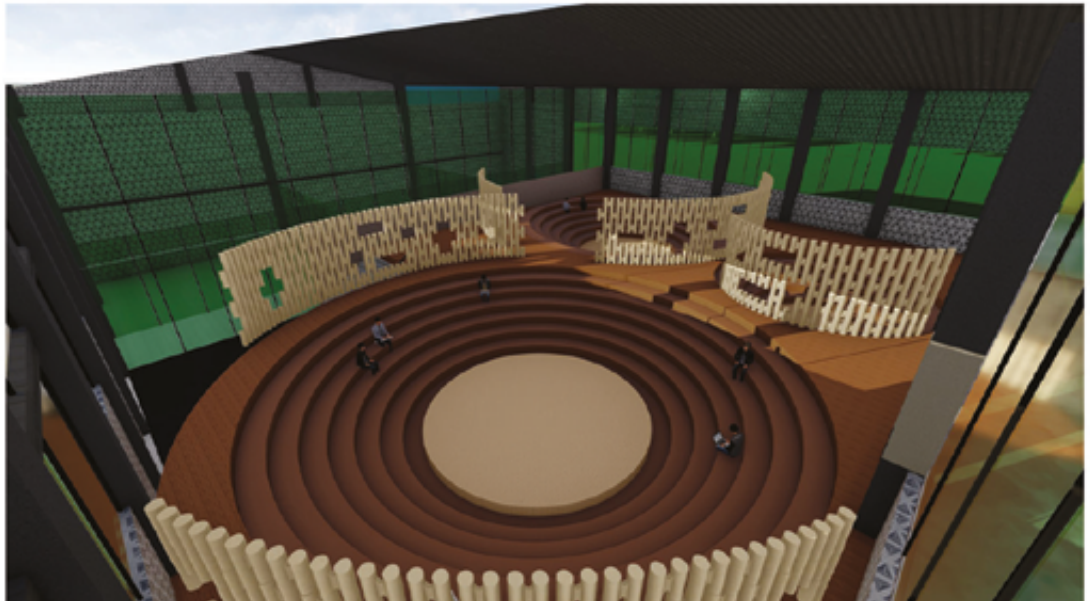
Figure 18





Gilgamesh Urban Farming Project – Correggiano, Ex-Zanussi area

Figure 15



# Gilgamesh

Figure 14

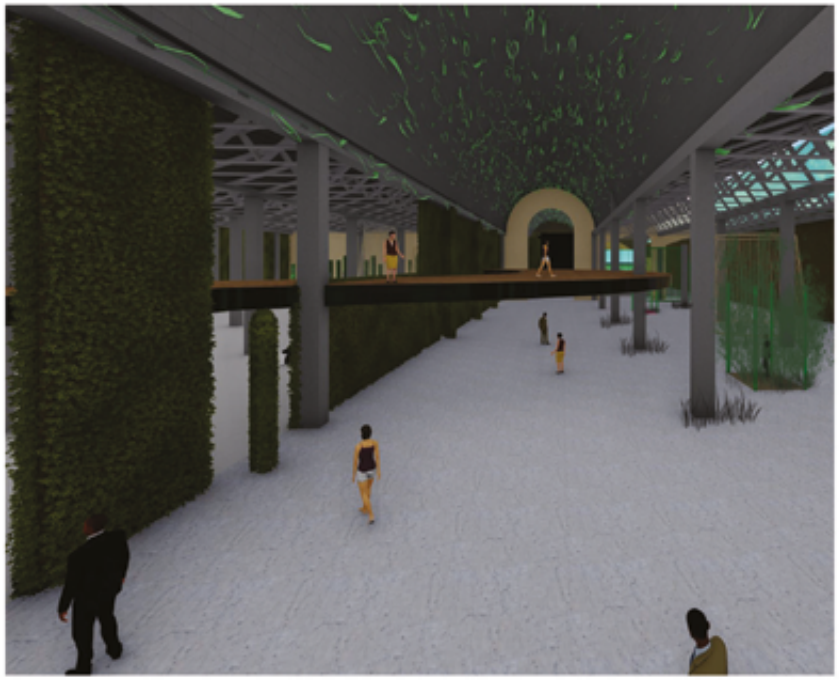


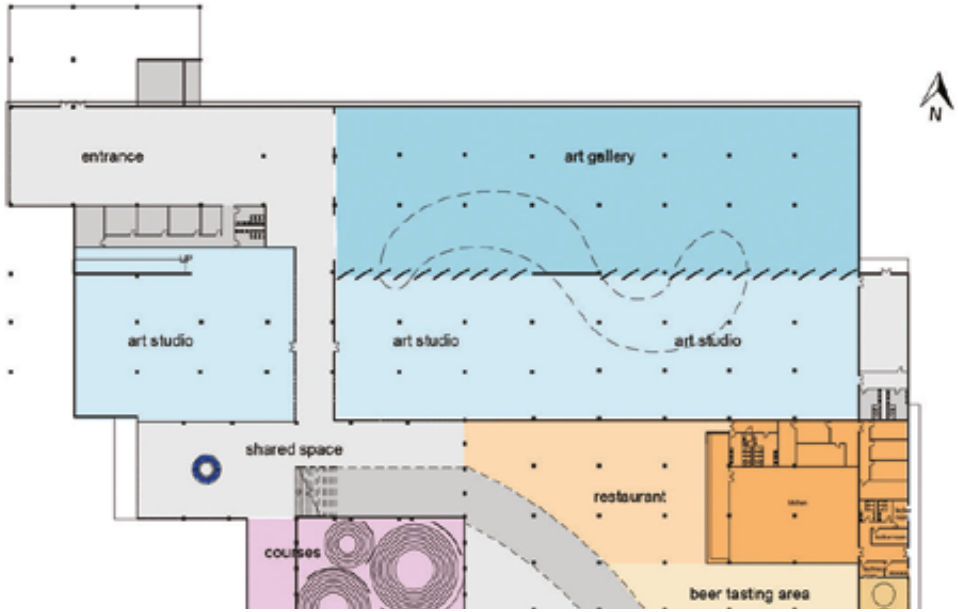




Figure 13



Figure 12




# Gilgamesh

# YS Design

**with:**

# The Green HUB

Youssef Mohammed AbouZied, Sara Samir Abouelsoud Mohamed

# Urban Farm 2019

GREEN HUB

DESIGNS

URBANFARM2019



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# THE GREEN HUB®

**Retrofitting this factory will turn an abandoned grey spot to a vibrant multifunctional heart for the city. This challenge is not just about creating an urban farm, but it is about creating a central hub for the city. We aim to create a self-sustained project that satisfies the social, environmental and economic needs of the society to emphasize the livability of the city while achieving harmony between farms and cities. Also, the project should help in raising awareness about the importance of urban farming for young generations as they are considered the future users.**

Our objective is to create a living heart for a vibrant city in order to have a user-friendly building that invites users to use it and enjoy their experience while adapting to the environment.

Conegliano is located in the province of Treviso in Northern Italy and the "black hole" Zanussi factory is located in the city center, which raises its value as a great asset for development. Our vision is to create a near-zero waste and energy building that is self-sustained, while serving its surrounding areas. We are intending to reach this by generating our own energy on site from various green energy sources such as wind energy and by creating a closed loop of material use to minimize the waste produced. In addition, we will use our cultivated crops on site in reflecting the city's iconic products as turning grapes into the famous dry white Prosecco or serving it as a local food specialty.

There are several opportunities that can be considered in the site. First, the area allocated (165,000 $m^2$) is a great opportunity to integrate various uses side by side. Beside the urban farm, we will also add a cafeteria, a grocery and other different social spaces. Second, the cold weather of the Treviso province limits the cultivation of the crops to a certain season of the year, but having a controlled environment will aid in providing these crops all year long. Therefore, we decided to choose the local crops that the area is known for and found in the citizens' daily diet such as: tomato, grapes, basil, eggplant, lettuce, spinach and pumpkin.

Last but not least, the near-zero challenges – we have three approaches to tackle these challenges:





Firstly, as for the waste management, we intend to create a closed loop -as will be shown later-that starts with an Aquaponics system [Fig. 1] of farming, which is a mix between fish and plants as the nitrates in the fish waste, is considered as nutrients for the plants. Furthermore, the waste water from this system is reused in irrigating the green panels of ivy on the facades [Fig. 2] to conserve water use and finally the remaining water is refined in a grey water system and mixed with some fresh water to start the cycle again.

Secondly, regarding the energy production, a Vertical Axis Wind Turbine (VAWT) module shall be used to generate electricity [Fig. 3].

Thirdly, as for the urban approach, we intend to turn this area into a multi-dimensional hub connected to the city to attract both citizens and tourists with different activities to make the space livable and more involved with the community [Fig. 4].

**Key Elements:**

The key innovation lies in the integration of all the pillars of sustainability equally, while creating a user-friendly system that emphasizes the idea of self-sustaining and waste reduction.

**Sustainable Development and Climate Change**

Climate change is an international phenomenon that is being tackled globally to counter its risks and keeping the warming level at 2 °C according to the Paris Agreement 2015 (COP 21), which was approved by 195 countries [1]. As Italy is affected by climate change impact, in our project, we will not only consider the environmental pillar, but we also tackled all the three pillars of sustainability (social, environmental, and economical dimensions) as well as the viability and livability.

**a. Environmental Aspect**

Firstly, in order to tackle the environmental aspect, we aimed to mitigate carbon dioxide ($CO_2$) emissions and reduce energy consumption by generating energy on site from VA Wind Turbines, passive solar heating by creating a greenhouse, double glazing [Fig. 5], as well as Boston Ivy green panels and multi-spectrum LED lights that save energy by 80 % and provide sufficient light for plants. One of the major decisions taken is to keep the current structure and retrofit it according to the program needed in order to reduce the waste in the embodied energy and maximize the use of the current situation. As the Hydroponic system had the least cost and global warming potential [2] we decided to use the Aquaponics system derived from it to provide a sustainable and organic source of nutrients instead of synthetic ones.

**b. Social Aspect**

As for the social aspect, the contribution and participation of the community is crucial for the success of our idea. The systems used in the urban farm can be easily used by most people so as to widen the possibility of employment of the citizens while having educational tours for students to raise the awareness about urban farming and mentoring the future generations. Also, an outdoor open-space is located in the western part of the project while trying to link it to the urban surrounding to serve as a central space. The Trevision cafeteria serves local dishes and products to users while they enjoy watching the crops and the fish in front of them to live the experience of the urban farming themselves.

**c. Economical Aspect**

Furthermore, the economical aspect is the most important one as it tackles the feasibility of the project and its long run profit. Adding a diversity of functions helps securing different income sources for the project so as to cover each other. The profit is distributed on the urban farming in several ways; selling the crops to users or the onsite shop, turning it to other products such as wine or serving in the cafeteria.

**d. Viability and Livability Dimensions**

Then we addressed the viability of the project by reducing cost of maintenance and energy consumption while mitigating the Carbon ($CO_2$) emissions at the same time, as well as keeping the current structure of the building and adapting to the new program. Additionally we used a closed loop water system to minimize the cost and water waste. In the end, the crops produced are either soled on site, delivered within the area or transformed to local products and served in the cafeteria to minimize the energy wasted in transportation and thus decreasing cost.

Finally for the livability of the project, we are trying to maximize the social interaction with the users and encouraging communal interaction between the citizens and the site itself by having tours inside the building for the people to view the whole process themselves and to help raise awareness about the importance of this project to help create a user-space bond. By achieving this we ensure the continuity of the project as it became part of the daily-life of these people.

Therefore, we managed to address the sustainable development pillars and its dimensions as well as SDGs7, 8, 11, 12 & 13.

**Summing this up, this project is about creating a new hub for the city of Conegliano that serves the people and reflects their identity while being self-sustained [Fig. 6] for many years to come.**





**1. Project Location:**

The Ex-Zanussi Factory is located in Conegliano, Province of Treviso. The site is considered to be a great asset due to its location near the city center [Figs. 7] in a really viable area surrounded by many bus stations, Conegliano central train station and four main streets (Via Daniele Manin, Via C.Colombo, Via Cesare Battisti, Via Innocente Pittoni) which secures a high flow around this area and thus making it a possible hub for the city [Fig.8]. Also, the community garden (Parco Mozart) is located on the Northern Western part of the site, acting as an important constrain to the design through its attraction to users as well.

As for the Environmental aspect, Conegliano is known for its cold weather during winter and medium temperatures during summer. After analyzing the weather data [Fig.9], we concluded that maximum temperature is approximately 33 °C while the least is approximately -6°C [Fig.10]. Also, the number of days inside the comfortable range of temperature is around 108 days a year; which means that 29.59 per cent of the days of the year can be pleasant for outdoor usage [Fig. 11]. The dominant wind direction is the NNW with a maximum wind speed of 19 Km/ h [Fig. 12]. The number of sunny days is Conegliano is 99.1 days a year which is 27.15 % days of the year [Fig. 13]. Finally, it rains during almost half the days of the year with various amounts of precipitation (2 mm - 100 mm) [Fig. 14].

**2. Architectural Solutions**

**2.1. Exterior Treatments:**

We consider this project to be a HUB for the city of Conegliano. Therefore, it should be designed to represent this idea in the best possible way. The building is oriented towards the NNW while the longer sides area towards ENE and WSW which have high solar exposure compared to the other facades. To adapt to this problem, we added Boston ivy plants on a cable trellis system to help reduce the solar gains, produce oxygen and represent the urban farming happening inside the building on its outside. As for the glass areas, double glazed glass shall be used to help retain the temperature inside during cold days and prevent heat loss. Most open facades will be finished with both double-glazed glass and some solid walls for the Boston ivy treatment to provide enclosure for the spaces inside to help control the temperature of the space to meet the requirements of the plant cultivated inside.

**2.2. Outdoor Spaces:**

The site contains a large un-built area in the western part. In our project, we intend to redesign this area to serve our project and thus the city. In this area we plan to create a social space for people (Piazza) [Figs. 15] containing seating areas, kiosks, green spaces [Fig. 16] and a kid's area [Fig. 17] for the neighborhood children to play in. Also, we intended to create a buffer zone on the northern part of the site by using wind turbines to generate electricity while creating a barrier from the train railway (generating noise) as well. Since the temperature is pleasant during some days as mentioned before, the concept of creating a place for people to interact is applicable while also tackling the social aspect in our vision as it serves the people acting as a central hub. This space will host various events to help people bond together during various occasions (Christmas, Easter, etc.). As for the two parking areas near the project, they shall be renovated and connected to our project to provide adequate parking spaces for the users. Finally, various pedestrian paths will connect the project to the main streets and the adjacent park (Parco Mozart) [Figs. 18].

**2.3. Internal Spaces:**

a. ***Farming Spaces:***

There are two different farming areas in the project; each dedicated for a specific use [Figs. 19]. The first area which is the largest will contain grapes as it is considered our main product to be used in the production of wine (prosecco). For the second area, the products used are going to be the ones sold in the store or used in the cafeteria such as: tomato, basil, eggplant, lettuce, spinach and pumpkin. These spaces are designed in minimal and simple way with the functionality of the space taken in consideration to help adapt to the needs of the urban farm. The different systems used were the key challenge for designing these spaces. Adequate lighting is needed through day and night by either natural or artificial lighting to cover the needs of the plants while also aiming to reduce the waste in energy by using high efficiency LED lighting with the best distribution possible. The temperature on the other hand is a key factor as well as each plant needs a specific range that it could flourish in, and this could only be achieved by using an HVAC system (Air to Air Heat Exchanger System) that aids in keeping the temperature in the required range, good insulation is needed to help reduce heat loss or gain depending on the time of the year (Outdoor Temperature). Finally, the double glazed glass used creates a greenhouse effect in the spaces during winter while preventing any heat loss to the outside.





b. ***Local Shop:***

The project will contain a grocery shop selling the organic products produced - as mentioned before - to the local community to provide them with organic products and thus providing an income source for the project as well [Fig. 20]. This space will contain a glass façade in the inside for the people to see the products while they are being cultivated to help raise their awareness about urban farming while also creating a bond between them and the place itself.

c. ***The Trevision cafeteria:***

To help enhance the social interaction in the project, we are creating a cafeteria that serves the local dishes by using organic products produced on site. This will help creating a special experience of the Trevision province for the users which might not only be residents but other Italians or even tourists to make them know the city better. This will create another source of income for the project while tackling the livability and viability of the project for many years to come. The cafeteria will contain a glass facade that overlooks a part of the farm, so that the people can monitor the process through which the cultivated products they eat undergo, in order to create a bond between the people and the place [Figs. 21]. The Cafeteria will also contain an outdoor extension that can be used when possible.

d. ***Gym:***

The gym area in this project has a social role in promoting a healthy lifestyle for the people. This space will include basic gym requirements for people to work out and play sports, and this will cover the social aspect we are trying to achieve in our project in order to reach a better and healthier community [Figs. 22].

e. ***Educational Farm:***

This area of the farm will contain plants which will used as classroom for schools during their visits [Fig. 23] in which they will teach the children about the importance of Urban Farming and allow them to experience that first-hand working with the plants and see how the system works with professionals on site. By creating this area, we open a chance for children to explore new possibilities and interests of what they can do when they grow up. This space can also host guided tours for people to experience this process themselves to help raise their awareness and increase the communal participation for people to work in such field.

*f.* ***Research Lab:***

By adding such space, we aim to make this site a pilot project in the field of urban farming throughout Italy. The project will not only cultivate plants but will conduct research on how to reach more advanced technologies and farming techniques that help increase both quality and productivity while still lowering costs [Fig. 24]. This facility can work with different universities around the area that specialize in this field while having a solid ground for experimentation. The lab will also ensure the quality of the cultivated plants according to the highest required standards acting as a quality control center as well. The space will be connected to the urban farm directly to ease the accessibility and experimentation done inside.

*g.* ***Stores:***

Another source of income will be from the eight stores located in the northern part of the project near the parking area [Fig. 25]. These stores will contain a souvenir shop along with other shops that will be rented. This will help keep the area lively and full of interaction.

*h.* ***Exhibition Area:***

This exhibition hall can host the local events for the city during festivals and holidays [Figs. 26]. This space can host the local events or competitions; this will create a sense of belonging to the place for the locals which will help to secure the viability and livability of the project for many years to come. The hall can be also rented to host any private event if needed.

*i.* ***Administration:***

Finally, the project will need an administrative area to supervise and run the project [Fig. 27]. This area will be located near the eastern parking zone (near Via Innocente Pittoni) which will act as a parking zone for workers with the service entrance for the project.



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**3. Agricultural Solutions:**

In this project we realized the importance of having a self-sustained project that can operate for many years with least amount of energy, minimal waste and best possible production.

**3.1. Aquaponics:**

For the Urban Farm we decided to choose the aquaponics system which includes a merge between raising fish with the cultivation of plants. The process starts with the raising of a type of fish that can be farmed (Telapia in our case), the fish produces Ammonia solid waste in the tanks, certain bacteria in water helps turning the Ammonia into Nitrates. As plants will be cultivated above the tank in small holes located in horizontal trays, water will move in pipes below the holes to supply plants though the roots with Nitrates. The waste produced from the plants could be used as a source of food for the fish and the cycle goes on. Waste water is recycled and then reused again in the tank which minimizes the water wasted. This process allows a both way benefit between the two species as each one of them uses the other's waste a source of nutrition while minimizing the waste produced in the process to help achieve the self-sustainability of the project.

**3.2. Boston Ivy:**

For the exterior, some parts of the facades are covered with Boston ivy plants that grow on a Cable-Trellis system. The reason we chose the Boston ivy *(Parthenocissus tricuspidata)* for various reasons;

- First, the plant can grow vertically with ease which will help us cover the façades of the project the way we need.
- Secondly it requires minimal maintenance thus reducing the needed work force and the running cost.
- Finally, this plant can withstand cold weathers without losing its leaves.

As for the water supply, we intended to use the waste water from the Aquaponic system to provide both water and nutrition for the plant without waste fresh water to irrigate the façade plants.

### 3.3. Cultivated Plants:

We intended to have two types of plants in the project, each that will be used for a specific use [Fig. 28].

1- **Glera Grapes** *(Vitis vinifera 'Glera')*: This type of grapes is the one used to manufacture the well-known prosecco wine. We intended to provide grapes for the wine industry found in Conegliano and its suburbs to help grow the industry while providing adequate income for the project.
2- **Tomato, basil, eggplant, lettuce, spinach and pumpkin:** these products can be cultivated easily in the aquaponics system while also being part of the daily diet of this region. These plants are found in many of the signature dishes of Conegliano.

### 3.4. Cultivation Cycles:

Not all plants will be cultivated in the same time, the plants sold in the grocery or the cafeteria will be sectioned into weekly cycles to provide the users with fresh products. As for the grapes they will be sectioned into larger monthly cycles to help cover the wages of the workers. This can be achieved because of the built-up controlled environment in the urban farm that allows all-year cultivation

### 3.5. Cultivation Process:

The cultivation and harvesting of the plans will be done manually which allows conducting regular checkups for the plants' health. The feeding of the fishes will be done manually, as well as conducting checkups from professionals. The other procedures will be done mechanically (such as ventilation, lighting, and water pumping). The urban farm will have multiple sensors that measure air temperature, light intensity, humidity, water pH levels and water temperature while all being connected to a control room for monitoring.





## 4. City Functionality:

The city functionality is achieved by creating both social and environmental values, along with achieving sustainable development goals, which will be explained in details in the following sections [Fig.29]

### 4.1. Social Value:

Creating a healthy and happy community is one of our main goals and we believe that one pilot could help make a difference in the city.

a. **Communal Participation:**
The project aims to include the people in the site daily by using the different services found and thus making it a livable place with an adequate daily traffic of users.
b. **Work Opportunities:**
Many job opportunities will be available after the project the starts especially for the younger generations, which will help increase the employment rates and the economic growth
c. **Raising Awareness:**
Guided tours are found on site, these tours will introduce the visitors to the whole process of urban farming and how it is done step by step with their guide. Also, visitors can try themselves planting or cultivating a plant in the educational farm. This process helps to make people familiar with urban farming and highlight its importance in the future.
d. **Child Development:**
The farm will include tours for schools to help raise the awareness of younger generations towards urban farming and the environment. The children could try the process by themselves and work by hand with the workers in the educational farm. This could help younger generations to get more oriented and explore a different field that they could decide to be part of when they grow up. We consider developing the younger generation to be a matter of great importance since they are considered the future hope for our planet.
e. **Encouraging Sport:**
Sport and physical activity are of high importance for the wellbeing of every single person and this is way we tried to encourage the physical activity of the users through creating the gym area. The gym is available for the users for a discounted fee in order to be affordable for most people.

f. **Community Entertainment:**
Providing the community with leisure spaces is no-less important than providing it with the needed services. We added various leisure spaces in our design starting from the exhibition hall that hosts both public and private events, the outdoor piazza and the kid's area for the children to enjoy.

### 4.2. Environmental Value:

a. **Healthier Environment:**
Urban farming is considered a huge opportunity to include a green spot in the heart of the urbanized and polluted cities. The plants help in purifying the air and reducing the carbon dioxide levels. In our project, the use of the aquaponics system is considered very sustainable and environmentally friendly since it wastes the least amount of water while producing organic products.

b. **Organic Food:**
Using the aquaponics system helps us in producing healthier organic products since it does not include the use of any pesticides or chemical fertilizers that both harm the environment and are bad for the human health.

c. **Adding Green Spaces:**
Our Project helps not only by providing organic produce but with green open spaces for the interaction of the people

d. **Responsible water consumption:**
Currently, water consumption is considered a major problem around the world and thus tackling this point is crucial. The water recycling system in our project was designed to reuse all the water found onsite without wasting any. The water used in the aquaponics system is reused in irrigating the façade ivy plants and the outdoor landscaping as well. Also, the basin water in the different spaces is reused in the water flush of the toilets to minimize the water waste.

e. **Conducting Research:**
Research is highly important in the development of our Urban Farm, this lab will do research on this area in order to help in having better produce amounts and less material usage. This lab will help keep this farm using the latest techniques and technologies in the field to reach the highest possible efficiency.

f. **Renewable Energy:**
On the northern area of the site, a wind turbine farm is located consisting of thirty three VAWT modules that help generate electricity on site. This will help in covering a share of the needed energy to run the project without putting any load on the city grid while reducing the Carbon footprint of our building.





### 4.3. Sustainable Development Goals:

According to the UN; *"The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests."*[3]

This attracted our attention that we should tackle these goals in our project and thus we will be helping to reach a more sustainable city in the journey of making our planet better. We chose to cover the SDGs that are most relevant to our project.

- **SDG 7 Affordable and Clean Energy:**
*"Ensuring access to affordable, reliable and modern energy for all has come one step closer due to recent progress in electrification, particularly in LDCs, and improvements in industrial energy efficiency. However, national priorities and policy ambitions still need to be strengthened to put the world on track to meet the energy targets for 2030"*
- We tackled this SDG in our project by covering our energy demand through the wind turbine farm found in the northern part of the project. This helps us provide the site with a part of its energy demand from a sustainable source while trying to minimize our consumption as well.

- **SDG 8 Decent Work and Economic Growth:**
*"Globally, labour productivity has increased and the unemployment rate has decreased. However, more progress is needed to increase employment opportunities, especially for young people, reduce informal employment and labour market inequality (particularly in terms of the gender pay gap), promote safe and secure working environments, and improve access to financial services to ensure sustained and inclusive economic growth."*
-In our project we are providing many work opportunities especially for the younger generations while creating an income source that helps in the economic

growth of the city as we are contributing to the growth of the wine industry in the area.

- **SDG 11 Sustainable Cities and Communities:**

  *"Many cities around the world are facing acute challenges in managing rapid urbanization— from ensuring adequate housing and infrastructure to support growing populations, to confronting the environmental impact of urban sprawl, to reducing vulnerability to disasters."*

  -The social aspect and our contribution to the community was a key factor for us. We tried to make the people included in the spatial program of the project as social spaces are designed so that people can use on a daily basis and thus keeping the site a part of the community and the city. Hence, we want our project to cover the needs of the people and thus contribute to the city.

- **SDG 12 Responsible Consumption and Production:**

  *"Decoupling economic growth from resource use is one of the most critical and complex challenges facing humanity today. Doing so effectively will require policies that create a conducive environment for such change, social and physical infrastructure and markets, and a profound transformation of business practices along global value chains."*

  -The material consumption was designed to minimize the waste and keep the best productivity/ consumption ratio. The aquaponics design cycle helps minimize the waste from fish or plants while producing the best produce possible. The grey water system helps reduce the water waste by recycling the farming water in irrigating the façade plants. Also, we tried to minimize the waste in building materials by keeping the current structure and retrofitting it to our spatial requirements.

- **SDG 13 Climate Action:**

  *"The year 2017 was one of the three warmest on record and was 1.1 degrees Celsius above the pre-industrial period. An analysis by the World Meteorological Organization shows that the five-year average global temperature from 2013 to 2017 was also the highest on record. The world continues to experience rising sea levels, extreme weather conditions (the North Atlantic hurricane season was the costliest ever recorded) and increasing concentrations of greenhouse gases. This calls for urgent and accelerated action by countries as they implement their commitments to the Paris Agreement on Climate Change."*

  -For us climate change is an important topic since it is affecting our planet and needs serious intervention. We were aiming to design a self-sustained project that produces the least possible amount of GHG emissions that are harming our planet. Also, we are aiming to put various types of plants on site in our





landscaping to help reduce the carbon dioxide levels and produce oxygen to reach a healthier environment.

**By tackling these Sustainable Development Goals we are not only aiming for a sustainable urban farm, we are trying to help create a sustainable city for the sake of our planet.**

## 5. Business Model:

### 5.1. Business Description:

The Green Hub® is an upcoming project located in Conegliano, Italy. It is an Urban Farm project that provides this city with organic produce along with a social hub for the people to enjoy. The products are mainly targeting the local community along with the wine industry.

The wine industry is one of the largest in this city and their prosecco wine is well-known both inside and outside Italy.

#### 5.1.1. Industry Overview:

The population of Conegliano in September 2017[4] was 35,023 with 38.36% of the inhabitants between the ages of 24-54 which provides a solid ground for employment. According to our research [5] the number of wineries in Conegliano-Valdobbiadene region is almost 168 different wineries; all producing different types of prosecco. The Conegliano School of Wine (Scuola Enologica) represents the importance of this industry for the area [6].

#### 5.1.2. Company Description:

The Green Hub is an Urban farm Company that provides both leisure services and organic produce to the market. The initial product will be Glera grapes for wine production, Mediterranean produce and various services (entertainment, retail, sports, research and educational).

#### 5.1.3. Current Status and Mission Statement:

*"Creating a living heart for a vibrant city."*

The site is abandoned currently and is described as a black-hole by the city officials, hence, the area is considered to be an asset for the city that should be utilized in a beneficial way. The reason of creating this project was to participate in the UrbanFarm 2019 competition, thus we came up to this idea after various analysis of the currents situation and constraints to cover all of the required aspects.

### 5.1.4. Goals and Objective:

Our objective is to create a central hub for the city that provides various services for the residents while also covering some of their needs for organic products along with high quality grapes for the wine industry.

In the future we intend to expand the grapes supply to the whole region and attract different users from outside the city to visit the project as tourists.

We also want to help create a better community that has high awareness to the environment and sustainability.

## 5.2. Products and Services:

- Conegliano is already known for the wine industry found in the area and the presence of the Conegliano School of wine reflects the importance of such industry. The difference between our project and the other vineyards is that our grapes are organic and produced in monthly cycles to keep constant supply to the wineries as it is cultivated in an induced environment. Also we cover the social aspect for the city as we intend to create a central area for the people to visit and enjoy themselves.

-This area can be used by anyone as a public space that contains various entertainment elements for different age groups.

- The user has different choices upon arriving to the site:

1- Using the public area (Piazza) to enjoy some relaxing or family time;

2- Visiting the Trevision Cafeteria that serves local dishes made with fresh products from the farm;

3- Using the public gym area;

4- Shopping at the local store that sells organic products from the farm; and

5- Having an educational tour to see the urban farm from inside and learn more about the process.

- All these options provide an experience that cannot be found in a traditional vineyard and thus making it having an advantage than any ordinary farm.

- We aim to create a project that people love and enjoy spending time as they feel sense of belongingness to it, and thus helping to keep this project running for a long time.

## 5.3. The Market:

### 5.3.1. Market Analysis:

The wine industry has been in this area for centuries and the Conegliano School of wine was founded in 1876 due to the importance of this profession. The ex-Zanussi area has





been abandoned since 2003 and many of the city officials have debated over this area and several purposes of urban requalification have been taken into account, whose the best idea is to use the area for an urban agriculture project promoted by Bologna University International Challenge, UrbarFarm2019.

### 5.3.2. Competitive Analysis:

The competition is considerably low as there is almost no other project in the area that provides the same services. However, the only competition that exists is from the surrounding vineyards.

### 5.3.3. Competitive Factors:

There are many competitive factors that should be tackled and highlighted. Table 1 presents these factors in terms of strength, weakness, competition and importance

**Table 1: Competitive Factors**

| Factor | Our Project | Strength | Weakness | Competition | Importance |
|---|---|---|---|---|---|
| **Products** | Grapes , Vegetables and Leisure Services | Variety of products and services | Risk of being distracted with different aspects | Provide only grapes | Critical |
| **Price** | Above Average Pricing | Price/ Quality ratio is very good | Higher pricing than usual for the buyers | Lower pricing but also lower quality | Critical |
| **Quality** | Organic produce with highest quality control | Highest quality in the market for excellent wine | | Non-organic | Critical |
| **Supply** | Monthly supply due to induced environment | All-year supply for the buyers | | Seasonal supply | Very Important |
| **Expertise** | Medium Experience | Contains scientists and professionals who provide training at the beginning | Team working is just starting | Very High Experience | Very Important |
| **Location** | In the city center | City center is in the middle distance between all wineries | Long distance for supply and delivery | Located near the wineries | Important |

From the above, we might conclude that we are a few steps behind the other competitors, however we are providing healthier produce, better quality and on site social services to contribute more to the community and the city [Fig 30].

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### 5.4.5. Advertising Strategy:

For the services, the best way of advertising for such a new project will be the word of mouth and the social media. We intend to create a grand opening event that will be announced in the city hall and with some street advertisement to reach as much people as possible in the beginning to make people familiar with such project. For the wine market we intend to target a more face to face approach with door to door sales to offer our services to these clients.

## 5.5. Operations:

### 5.5.1. Operation Strategy:

The farm will be working all days of the week consisting of two shifts one from 7.00 AM to 2.00 PM and from 2.00 PM to 9.00 PM to provide the required attention needed for the plants and the fish. The shops, gym, store and the cafeteria will be open from 8.00 AM to 10.00 PM, providing all three meals. The Exhibition hall will work during public holidays or from private reservations on normal days with an opening hour of 12.00 PM till 10.00 PM. As for the visits, the farm is open for school visits during normal days and public visits on the weekends from 12.00 PM till 4.00 PM. The research lab will be under the control of the University of Bologna for both research and quality control as seen appropriate by them.

### 5.5.2. Personnel:

The project shall have a project manager that is located on site to supervise most operations along with a financial controller and a public speaker for marketing and advertisement. For the farming team we shall have 3 workers each shift accompanied by an agricultural engineer to monitor the production process and the plants' health as well as tutor for the visits. In addition, 2 receptionists for the lobby front desk will be present. For the cafeteria we need a chef, sous chef, 2 cleaning workers, 2 waiters, head of cafeteria and a cashier. The local store will need 2 cashiers and 3 employees. The gym will need a receptionist and 2 trainers to help people with their workouts.

Finally for the maintenance the project, we shall have a contract with a company that covers all the required repairs and maintenance for the farm and the facilities.

### 5.5.3. Scope of Operations:

We need to furnish the farm area with the required module to start the plant production as soon as possible while also starting with the gym, cafeteria and the

store. These three spaces can have 2 weeks of soft opening before starting with their full capacity after the grand opening. The place will need cleaning and renovation in many different aspects to meet the required standards. Finally, we will need to install the needed systems (HVAC, lighting, and plumbing) as they are considered essential for the success of the farm.

#### 5.5.4. Location:

The location is the ex-Zanussi area in Conegliano is selected as we saw great potential in the city and in the site itself as it provides large spaces that can have many different activities that meet our vision.

#### 5.5.5. Payment of Employees and Incentives:

We intend to pay the employees monthly, incentives and sick leaves.

#### 5.5.6. Recruiting new Employees:

New employees would be selected after applying for the job by going through an interview to determine if they are qualified for the job. If accepted they will receive all the benefits and payment of a current employee starting from their date of employment.

### 5.6. Financial Information:

#### 5.6.1. Startup Expenses Capitalization:

The initial cost for the startup will be for renovating the site and buying the required equipment and systems for each space according to its design. The costs shall be covered by an investor along with governmental grants and sponsorships that could help the project to start.

#### 5.6.2. Twelve-Month Profit and Loss Projection:

In the first year, we hope to provide no less than 20 wineries with the needed supply of grapes. During that time, the marketing team should assess the actual market share and the users' feedback on our products and services.

#### 5.6.3. Four Year Profit and Loss Projection:

By that time, we intend for the project to cover most of the wineries in the area with long-term contracts as more stability is achieved. Also, our products shall be





improved with time after receiving the feedback. We intend covering at least 40 % to 60 % of the project initial cost by that time.

### 5.7. SWOT Analysis:

A quick conclusion for the different points found in the project [Fig. 31].

#### 5.7.1. Strength:

- Organic produce
- Sustainable sources
- Self-sustained
- Multi-dimensional

#### 5.7.2. Weakness:

- Large scale
- Multi-oriented
- Needs skilled workforce

#### 5.7.3. Opportunity:

- Job opportunities
- Communal Participation
- Future development

#### 5.7.4. Threat:

- High initial cost
- High running cost

## 6. Sustainability:

The main challenge for this site was its huge scale but at the same time it was its biggest asset. Since we decided that we wanted to create a new **Green Hub**, then we had to make it as sustainable as we could. Given the size of such project, it was a challenge to address all three pillars of sustainability and balancing between them.

### 6.1. Economical:

The economical aspect is considered one of the important aspects of sustainability as the cost of the project can determine the feasibility of the project. In our project we decided to distribute the sources of income found in our project in order to help supply the farm with enough money to cover its expenses while keeping the produce in a considerably low price for the people to buy easily (social aspect). Also some services that are found in the project are provided for a considerably low or discounted fee to help serve the community with the least possible charge on the people.

The main sources of income in the project are the money earned from the grapes sold to the wine industry, products sold in the local store, the cafeteria and the rented shops. The variety of income sources helps maintain the project's viability. We wanted to create a project that can be self-sustainable whether economically or environmentally.

### 6.2. Social:

The social aspect in our project was a key element that was addressed in the design process itself. The main factor of success in this project lies on the communal participation as we are aiming to create a new vibrant city heart for Conegliano. We wanted to create a project that the people felt that they belong to and are part of. The **Green Hub** contains many spaces that encourage the social interaction; the outdoor piazza, kid's area, gym area and the cafeteria.

All these spaces are designed for the people to come and visit the site on a regular basis to feel that this area became a part of the city fabric once again; thus, this sense of belonging will ensure the livability and viability of this project for years to come.

### 6.3. Environmental:

Last, the environmental pillar was tackled in our in our project too. We tried to reach a near-zero energy and waste building through a design of dependent systems that work with each other to minimize the waste of materials or energy.

We designed this on many levels: 1) the Aquaponic system that helps minimize the water waste and recycles the fish and plant waste as mentioned before; 2) the wind turbines found on the northern part of the site help to generate onsite energy that helps reduce the energy waste and thus minimize the costs; 3) the energy efficient LED lighting, for the facades; and 4) the Boston ivy that requires minimal maintenance and adapts to the cold weather of Conegliano mixed with double glazed glass to minimize the heat loss/gains.

We tried to minimize the GHG emissions to reduce the project's carbon footprint and keep the site eco-friendly as much as possible. Another important decision we made was to keep the current structure while retrofitting it to meet our needs to reduce the waste in the embodied energy.



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## 7. Conclusion:

The **Green Hub®** is a project that aims to integrate the urban farm with its surrounding urban context to create a living heart for the city of Conegliano.

This project covers all three pillars of sustainability; environmental, social and economic aspects to achieve a self-sustained project.

For us, communal participation was a key factor in our design.

We were keen to create various social spaces beside the urban farm to attract more people to the area.

We hope that our project helps to create a lively, healthy and sustainable urban environment [Fig.31].

# Annexes





## Annexes

**Used Technologies:**

- **An Aquaponic** [7] is a hybrid system that uses two different species together; the fish are raised in the water used for the Hydroponic system of farming and thus the fish waste in the water is used as nitrate nutrients for the plants. The water does not need to be changed as often as in the hydroponic system so less water is wasted in this system and less maintenance is required. The system is composed of a water tank, an oxygen ($O_2$) pump for the fish, a bio-filtration system, UV filtration system, temperature control and finally solid waste removal.

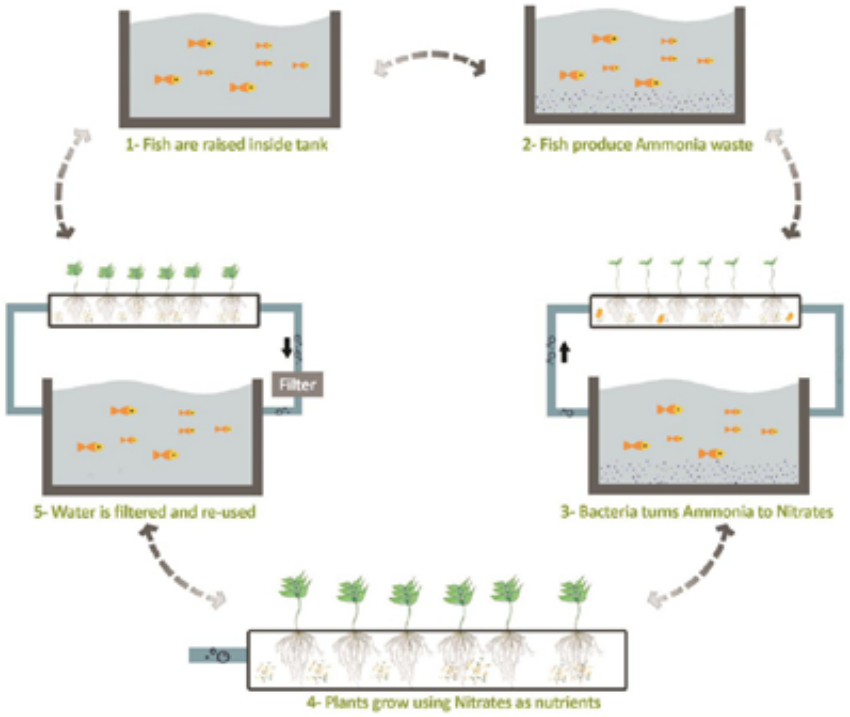


**Figure 1: The Aquaponic System**

- As for the **lighting system**, it is considered one of the vital systems for plant growth as it provides the crops with the necessary light for completing the photosynthesis process and that is why the used LED lights should have a full range of spectrum lights and a PAR "photo synthetically available radiation" meter to measure light values so as to determine when the light bulb is not providing the needed amount of light.

- **Cable Trellis System** [8], stainless steel cables are hung from a hanging tray on the top of the building and thus allowing the Boston ivy to climb on it leaving the facades free and easing the maintenance of the plants while keeping the building structure safe.

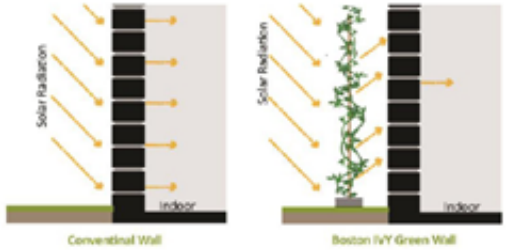


**Figure 2: Green Façade**

- **Urban Vertical Axis Wind Turbine (VAWT)** [9] was a good choice to generate energy while using it as urban furniture due to its relatively small size and low noise.

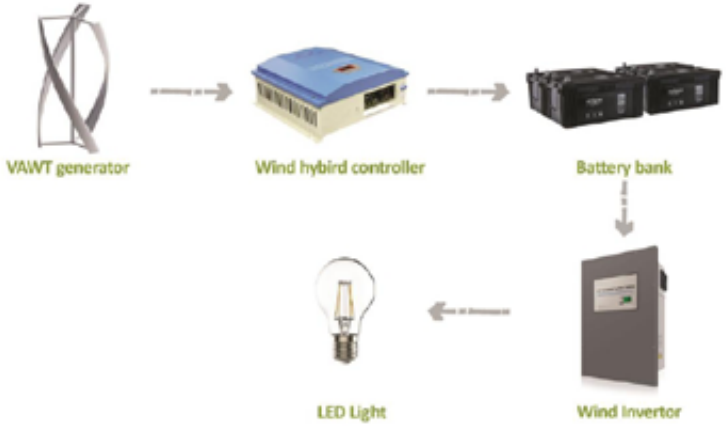


**Figure 3: VAWT system**





- For the ventilation system we used **Air to Air Heat Exchanger system**[9] which uses no mechanical parts to move or to cool/heat the air but instead a combination of copper tubes with a phase changing liquid are used in the system. The heating and cooling cycle repeats continuously with no moving parts, which makes air to air heat exchangers an extremely efficient, low-maintenance, enclosure cooling solution.

- **Double glazed glass** will be used to replace the existing one so as to minimize the heat lose/gain to maintain comfortable temperature inside for the plants with minimum heating/cooling required.

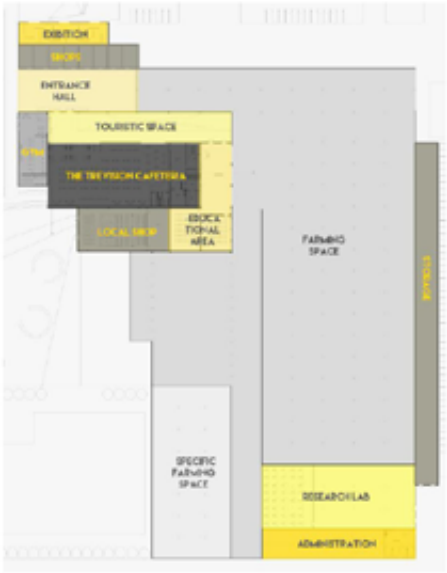


**Figure 4: Project Zoning and uses**

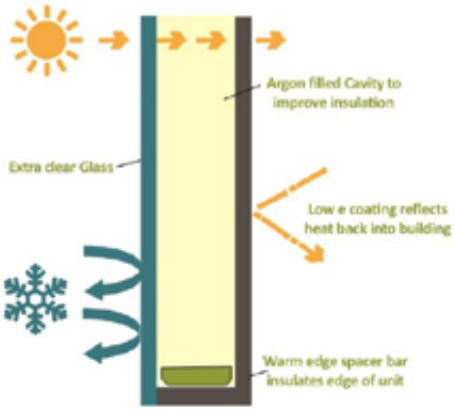


**Figure 5: Double Glazed Glass**

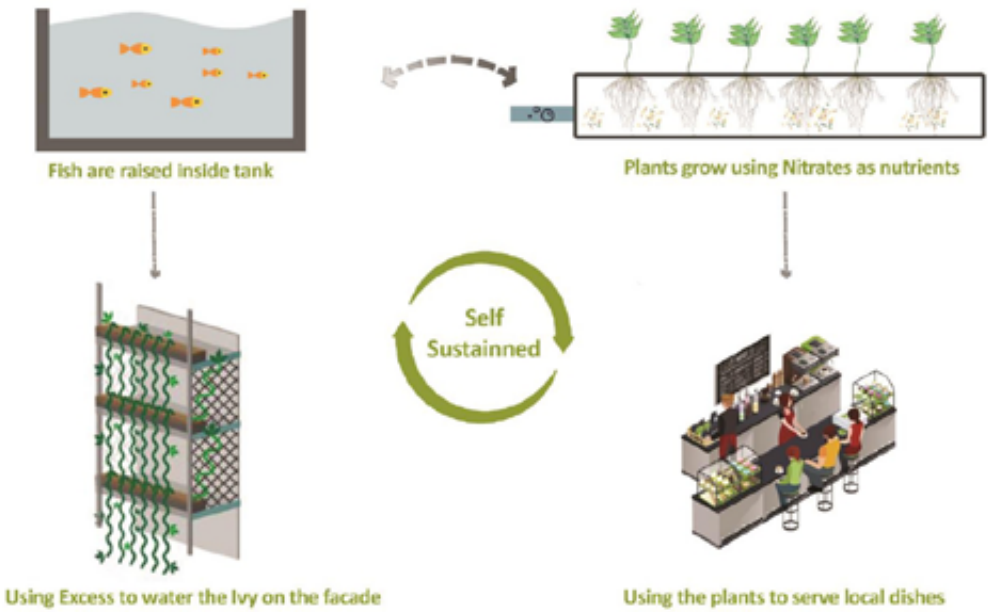


**Figure 6: Closed Loop Design**


**Figure 7-A: City surroundings Map**






**Figure 7-B: Site surroundings Map**


**Figure 7-C: Solid and Void Map**

Figure 8: Transportation Map

Figure 9: Environmental Analysis





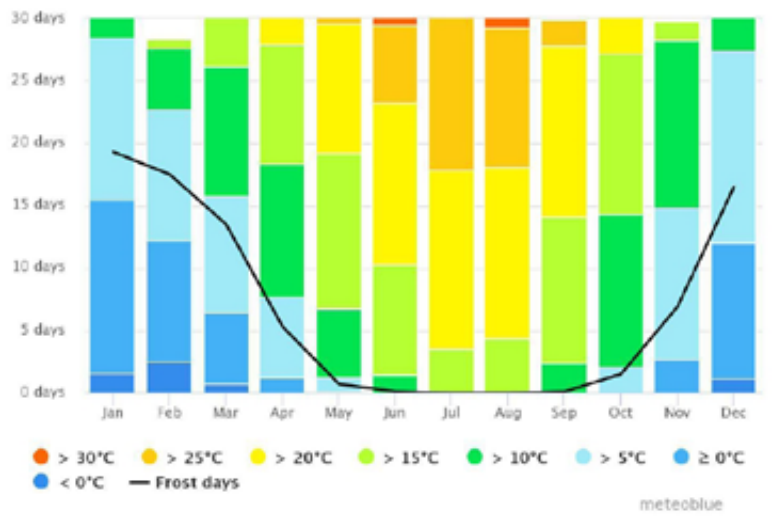


Figure 10: Maximum and Minimum Temperatures [10]

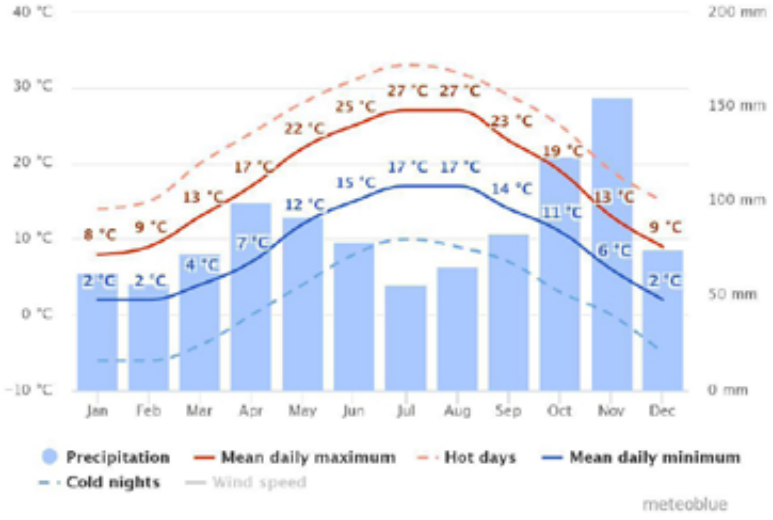


Figure 11: Average Temperatures [11]

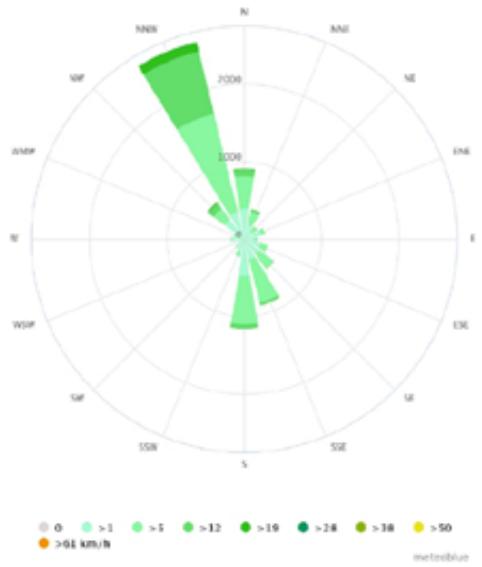


Figure 12: Wind Analysis [11]

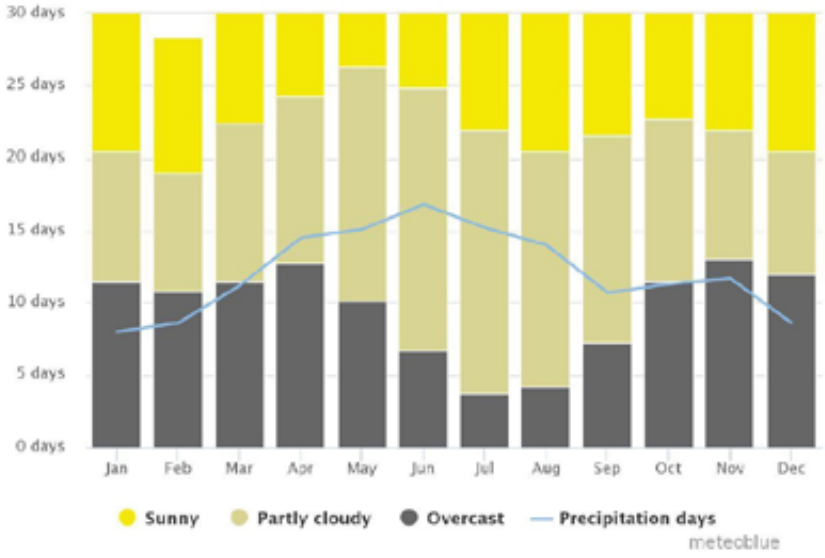


Figure 13: Cloudy, sunny, and precipitation days [11]





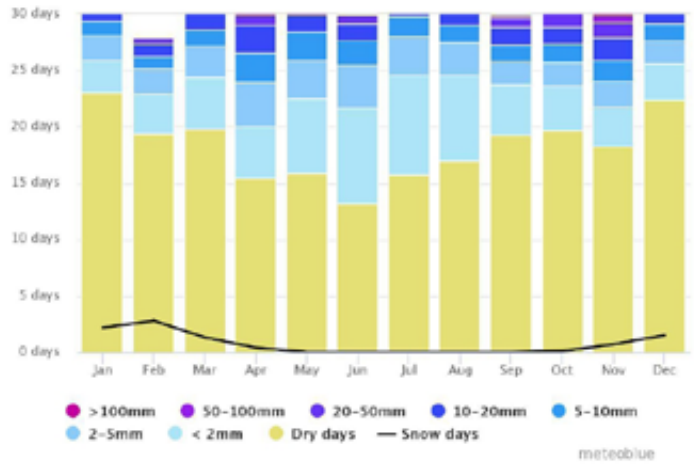


Figure 14: Precipitation Amounts [11]

Figure 15-A: Outdoor Piazza

Figure 15-B: Piazza General View

Figure 15-C: Piazza General View





Figure 16: Garden General View

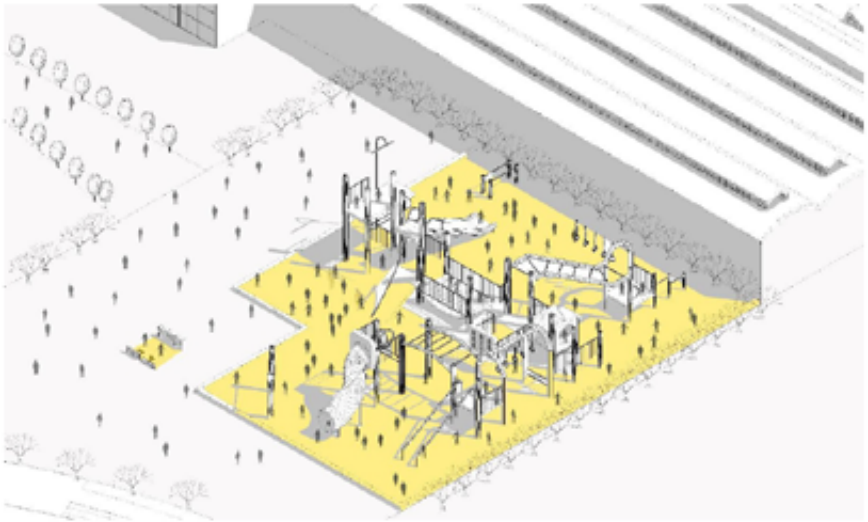

Figure 17: Kid's Area

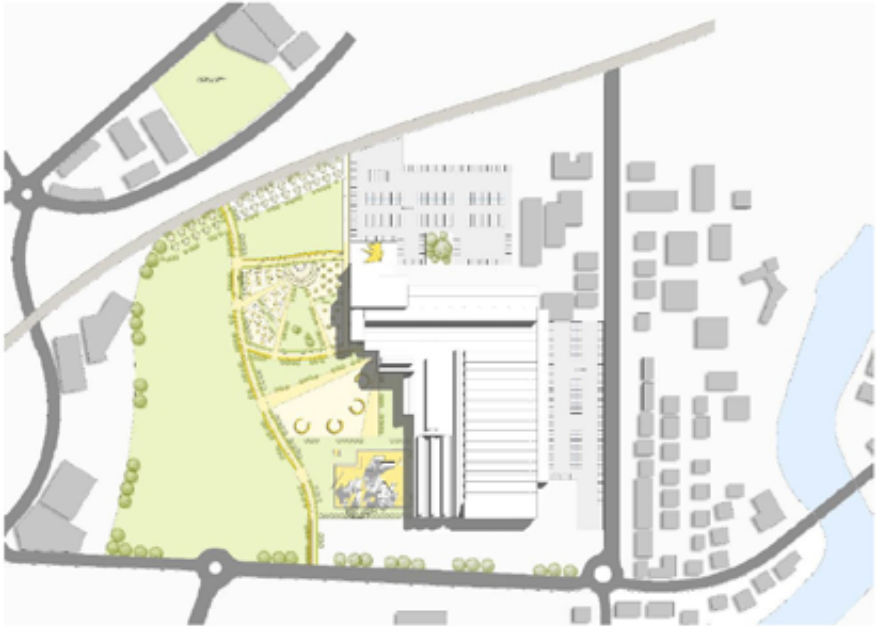

Figure 18-A: Site Layout

Figure 18-B: Pedestrian Paths General View





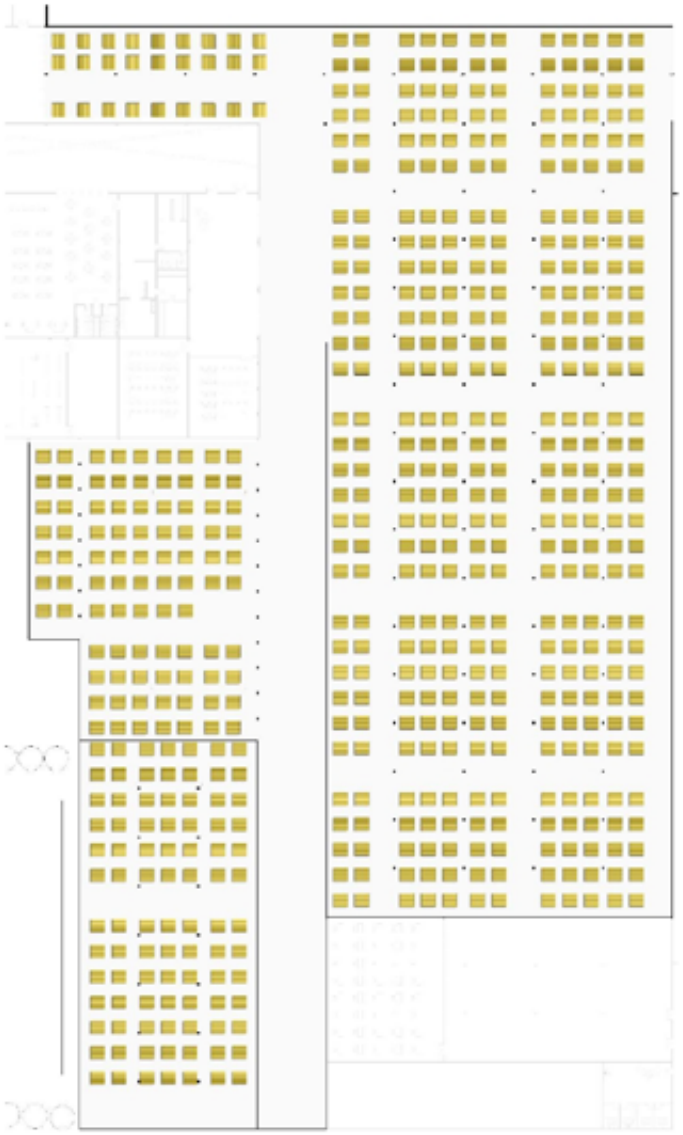

Figure 19-A: Farm Plan

Figure 19-B: Farm Section

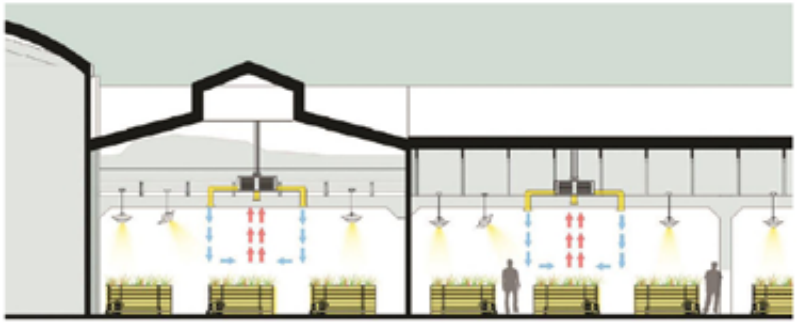

Figure 19-C: Farm Used Systems Sectional view

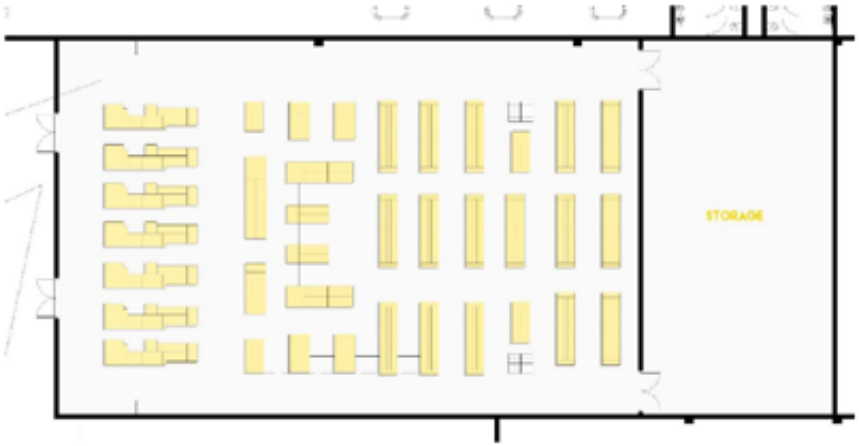


Figure 20: Local Store Plan





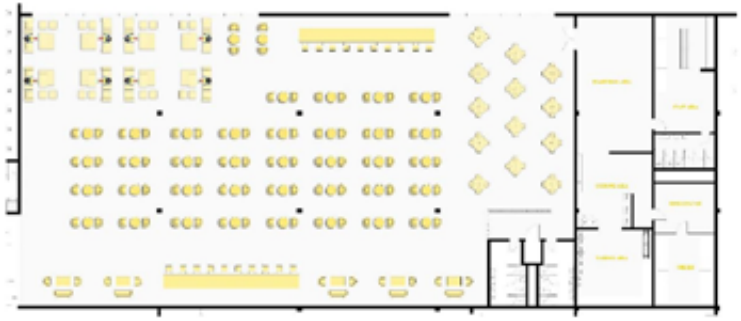

Figure 21-A: Trevision Cafeteria Plan

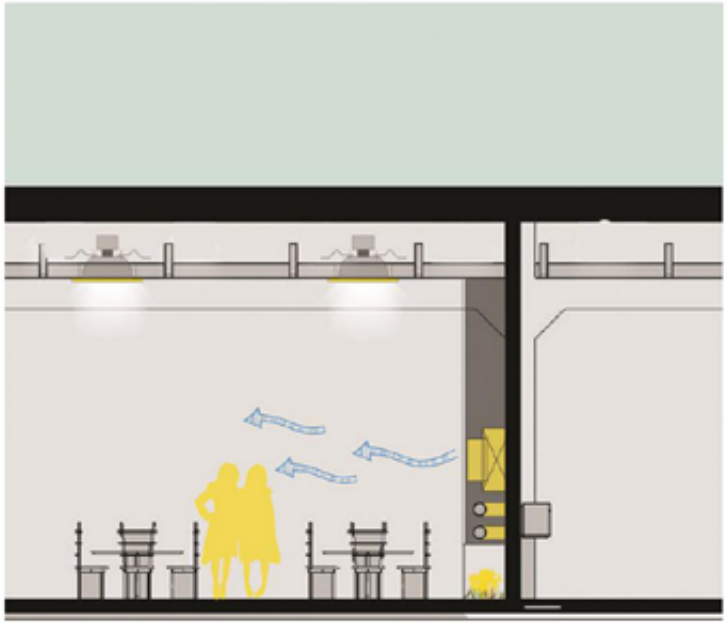

Figure 21-B: Trevision Cafeteria Used Systems Sectional View

Figure 21-B: Trevision Cafeteria Entrance View

Figure 21-C: Trevision Cafeteria Interior View





Figure 21-D: Trevision Cafeteria Interior View

Figure 22-A: Ground Floor Gym Plan

Figure 22-B: First Floor Gym Plan

Figure 22-C: Gym Interior View

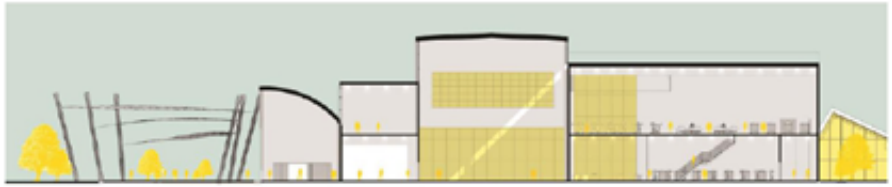

Figure 22-D: Gym Sectional View





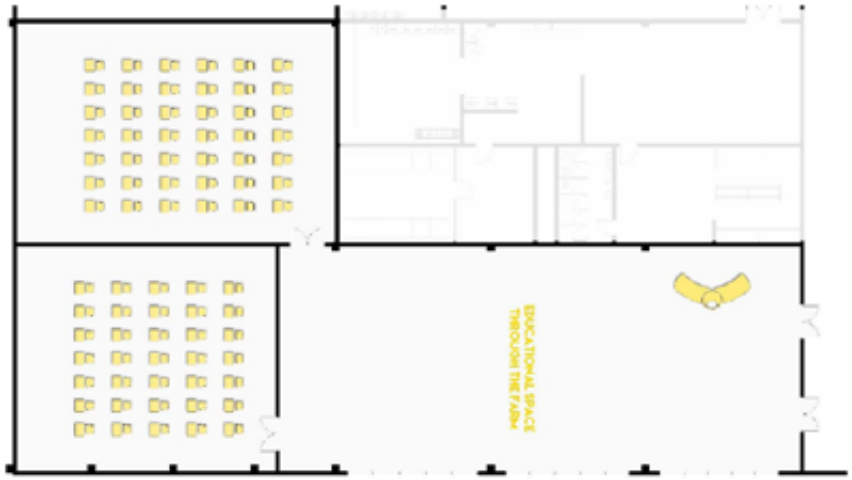


Figure 23: Educational Farm Plan


Figure 24: Research Lab Plan

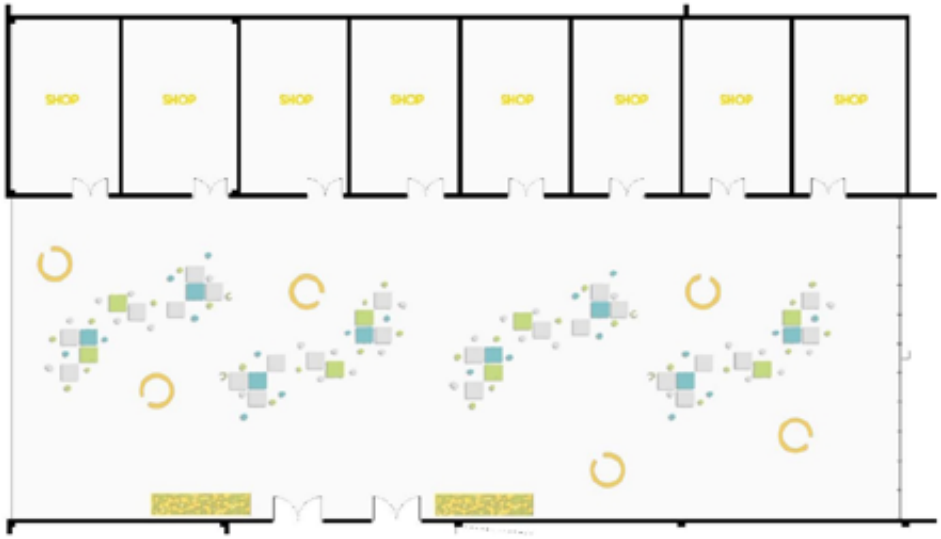


Figure 25: Shops and Main Lobby Plan

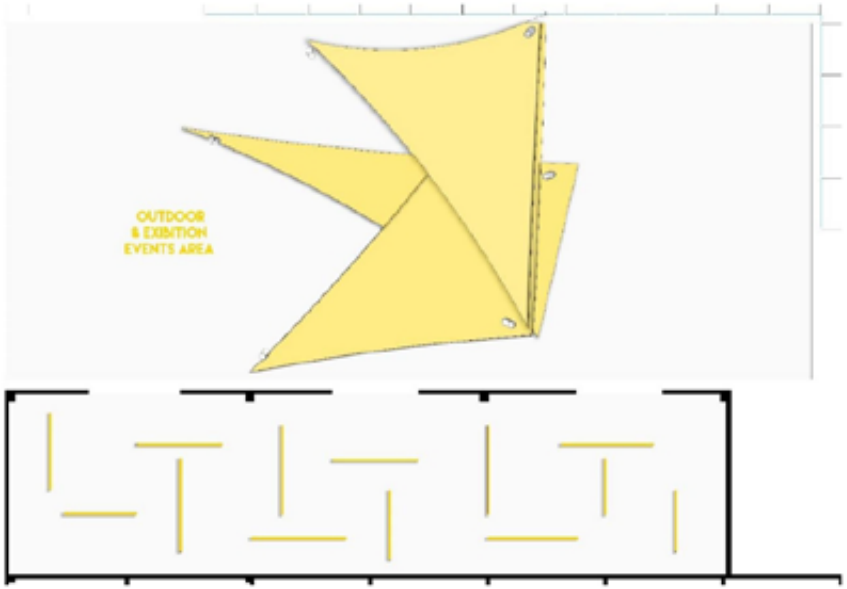


Figure 26-A: Exhibition Area Plan





Figure 26-B: Exhibition Area Entrance View

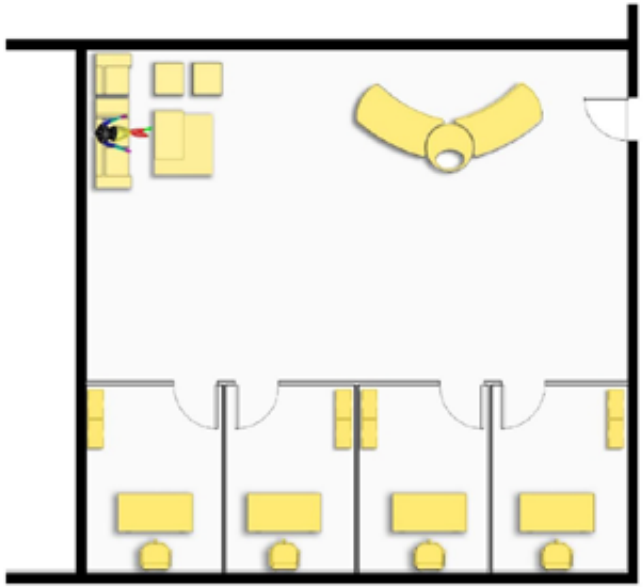

Figure 27: Administration Area Plan

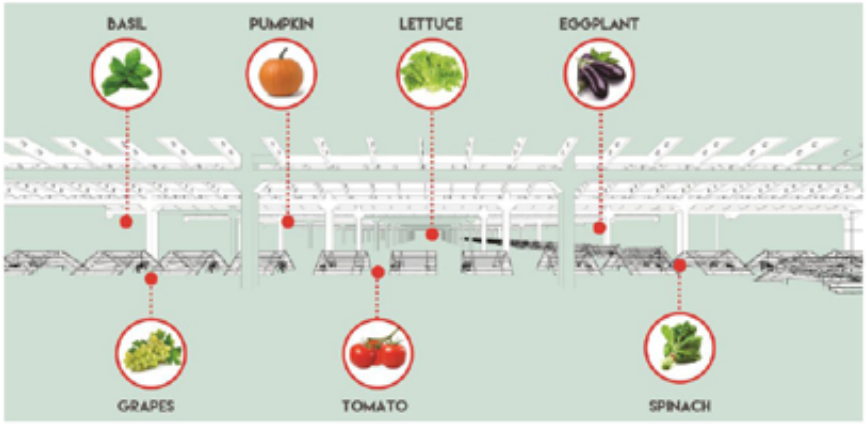


**Figure 28: Cultivated Plants**

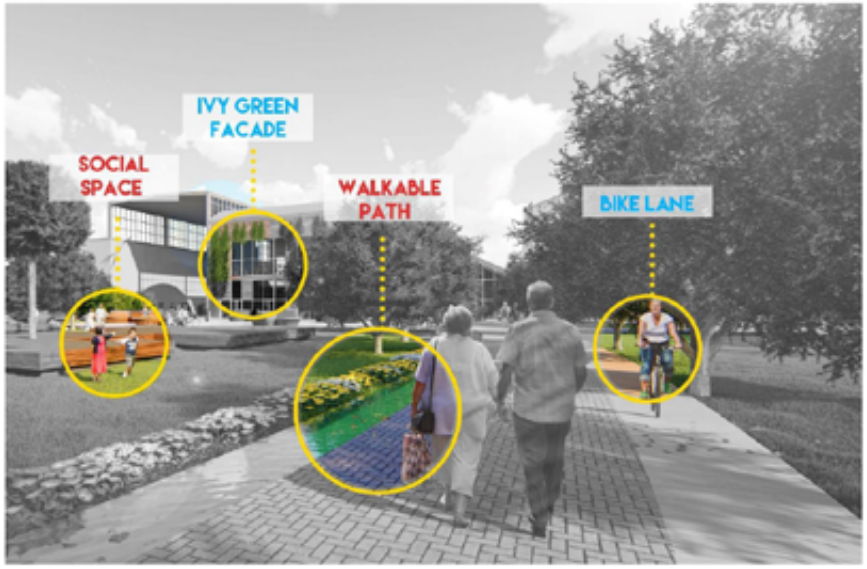


**Figure 29: Site and city integration**






**Figure 30: Green Hub vs. Traditional Farms**


Figure 31: SWOT Analysis

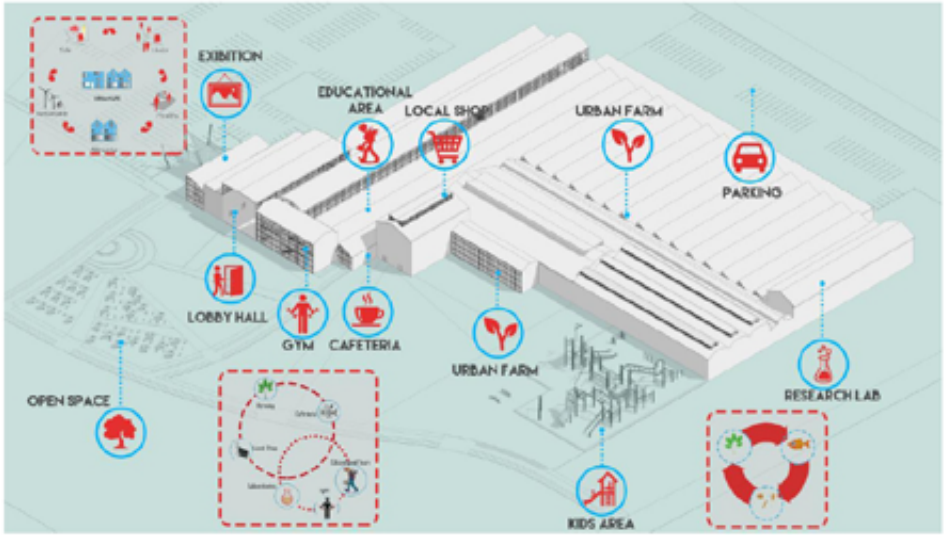


**Figure 32: Project Conclusion**





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[2] Sanyé-Mengual.E, Orsini.F, Oliver-Solà.J, Rieradevall.J, Montero.J, Gianquinto.G, 2015. Techniques and crops for efficient rooftop gardens in Bologna, Italy. *INRA and Springer-Verlag France*. P.1485

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# Green Senses

**with:**

# Health Senses Path

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**Green Senses - Conegliano**

**Concept**

An old, large plant in ruin with a huge and unattractive concrete surface outside, in the centre of Conegliano, is going to become a complex, modern and sustainable **health centre** with a **multifunctional park**, called ***Health Senses Path***. The main idea behind Health Senses Path is to enable and enhance people in the region, as well as many tourists, to actively take part in a health path stimulating all human senses through categories of a healthy lifestyle. This is possible thanks to a public park divided into main zones based on the **5 senses** and a large **urban farm** together with many other functions catering for numerous social needs. The park which will be the green core of the city of Conegliano will expand the green into the rest of the town.

The urban farm and the park are thought of as a one consistent concept. There are also more lateral paths connecting directly categories, so that the programme may be more flexible. The core of the idea is maintaining (prevention) as well as regaining health (therapies) through taking advantage of all possible measures in accordance with and thanks to all richness that can be taken from **nature**. The visitors also learn some important ecological issues. The path provides numerous and various activities and opportunities for different visitors, also tourists and for all social and age groups. In the middle of the park there is a circular main square that emits vivid lines of 'living' belts of projected high green and also leads to the categories of a healthy lifestyle in 5 senses zones. The park and consecutive zones are divided by green, spiral, expanding from the central piazza belts with loosely assembled trees. The *plazza* is the main place for meetings, improving social bonds. There is a small amphitheatre - as an introduction to the hearing zone; a playground – to the touch zone; herbs – to the smell zone; greenery – to the taste zone and a water blade to the sight zone. Another gatherings places are a restaurant on the second floor (first above the ground floor) of the western part of the building with a quasi-vault, the green roof just next to it and an open space with cafés in the park to the west of the restaurant. This restaurant gives the opportunity of a clearer view of the park and its forms. The green roof, moreover, provides two main attractive views on the northern hill with a historic centre and the park itself. The major part of its area is intended for outdoor urban farm but there is also place for tables and park furniture to enable social interaction and enjoying the views.

In the endeavour to meet sustainability of the concept, renewable sources of energy play the first role in electrical power supply. Solar panels, complementary - wind turbines system and biomass-fired power plant using, among others, waste from the whole site are the main systems. An additional one is outdoor gym in the park with energy generators.

Previously mentioned categories of humans' life are arranged on a physical path that can be, nonetheless, rearranged. To begin with **education**, visitors are presented with the ideas behind urban farm as such, also the ideas behind Health Senses Path and some ecology issues thanks to e.g. the library. There are also healthy cooking classes close to the restaurant. After that, there is a visit to the laboratory and supplements factory to get to know with the scientific background and do some **research**; then to a botanical garden with medicinal herbs, edible flowers etc. Next, the **work** in the vertical farm, tropical greenhouse, green roof, compost and biomass power plant is shown to know what goes on backstage. Later, the visitor enters the **socialisation** and relaxation part, that is the main square with park furniture, open space, amphitheatre, playground and fountains. Consequently – **consumption** - visitors are encouraged to check the restaurant's menu and its views and continue going up to the green roof. Going out they will access an open space with cafés, on the right – a market. Subsequent time will be spent on the walk through the western part of the park passing by outdoor gym, hearing zone facilities (music and meditation) and touch zone with a **therapy** of massages and **sports** hall with saunas. Finally, they may arrive to the organic shops close to the departure point.

**Main aim**

The main aim of the concept is health education. Every function or technology use is based on the premise that the visitors are going to learn and experience a healthy lifestyle. Everyone will find something interesting for them and, hopefully, remember some useful information or experience throughout their lives helping themselves and others. Another premise is ecology, actually a broader term but implying health education itself. Every new visitor is presented with guide tours and the designed programme of specific functions corresponding to defined categories. Nonetheless, the organic-shape paths are designed in such a way that a chosen path is very flexible.

On the one hand, theoretical base can be learned thanks to: exposition spaces, educating boards, guide brochures, food production - urban farm, laboratory and health-related disciplines library, renewable sources of energy in 4 ways, developing consumer awareness – supplements, cosmetics and perfumes factories – and well-balanced diet knowledge.

On the other hand, the following main experiences are to be practiced: nature observation (the green and other plants, water), cooking workshops, therapies – phytotherapy (e.g. tea in a bar), chromotherapy (relaxation thanks to colours of the flowers), detoxification in sauna, sun-bathing in open spaces – natural vitamin D3 production, physical activity – walking, running, cycling, exercising – fitness, playing sport games, relax – piazzas, among others with music.

**Main innovations**

The most important innovative system used in the HSP is aquaponic system for growing plants. Thanks to the fish (aquaculture) the plants in the system benefit from bacteria from their waste. A hydroponic system enables a control of the nutrients and practically elimination of any toxins and insects that would otherwise attack grown plants. Many hundreds of meters of vertical farm will give an abundant supply of greenery, herbs, etc. Compost will make use of the organic waste from the site.

All four sources of renewable energy from the project are a creative way for energy supply. There is a large system of solar thermal panels, a smaller wind turbines system and a biomass-fired power plant using the waste from the HSP. The most innovative of them is outdoor gym with energy generators. These "green outdoor gyms" already work in the world gaining much popularity, because one can join gym exercises with charging a cell phone. Another developing technology are electric cars. A new electric vehicle charging column will develop the existing net in the city. Also water will be saved by stormwater management and rainwater collection.

The whole facility constitutes an innovative compound of urban farming with a multifunctional park. Ramps join the inside with the outside in an unexpected way. A part of the southern wall of the complex is covered by a green wall and two northern parts by a green roof.

**URBAN FARM DESIGN**

Architecture of today has also the task of building spaces in which new relations with agricultural practices should be allowed. The challenge was to harmonize the experience in the building with the outdoor park.

The project is based on the concept of giving - at least partially - answers to fundamental problems such as the need to find a relationship with nature also in urban areas. Specifically, for the sustainability of the project, it was decided to focus on mutuality. Currently around 25% of the medicines on the market are obtained directly from plant material. This percentage increases to 50% if you consider the products over-the-counter and 90% when it comes to healthy products. 80% of the products on the European market comes from spontaneous collection and 20% from dedicated productions.

The consumption of medicinal plants, especially medicinal ones, is constantly increasing worldwide, both in industrialized countries and in developing countries.

The project is based on three fundamental pillars: education, production and retail.

**EDUCATION**

Educational activities will take place in the food and environmental education sector contributing to the knowledge of the agricultural world.

In practice, the educational offer takes the form of activities that are at the same time formative and involving psychophysical: the deepening of the aspects of cultivation, ecological and environmental education, guided tours in the countryside, "active" laboratories that allow guests to follow and participate in the processing of products, as well as taking part in the workshops.

**PRODUCTION**

The solutions used are of two types, implants without substrates characterized by the closed cycle, i.e. by a system in which the nutritive solution is recycled in a continuous or intermittent manner and the plants with substrates with deposits and additional pumps that allow recycling.

**PLANTS WITHOUT SUB-LAYER**

Soil-free systems without substrates based on hydroponic, aeroponic and aquaponics sytems, cultivation techniques represent the solution for the renovated building.

Among many advantages there are:

- Increase in unit yields and.
- Improvement of the organoleptic characteristics of the productions. Reduction of labor demand following the elimination of particularly burdensome cultivation practices
- Reduction of water consumption
- Reduction of the use of plant protection products

**PLANTS WITH SUB-LAYER**

**Green walls**

Green walls, equipped with a substrate system contained inside pockets or containers. The irrigation of nutrients is usually done through a fertigation system that distributes the macro and micro elements. This solution generally has high costs, therefore, its use is limited.

**Hanging green**

This type of coverage is to be the flywheel to be spread within the cities of Conegliano for the multiple environmental and economic benefits associated with it.

Environmental advantages

- Improvement of the microclimate thanks to the mitigation generated by the evapotranspiration process.
- Decreased heat island effect in urban areas due to a lower albedo effect compared to traditional roofing.
- Improvement of the air quality determined by the action carried out by plants in terms of dust capture and smog components and CO2 fixation.
- Improved water regulation thanks to the substrate and the draining element which retain a high percentage of rainfall and release it slowly into the atmosphere through the evaporation and transpiration of the plants.
- Noise reduction due to the combination of layers of the technological package and even 8-10 dB of plants compared to a traditional roof.

Economic benefits

- Longer waterproofing life due to weather protection determined by the technology package.
- Better thermal insulation of the covers.

**RETAIL**

The transformation and direct sale of products, with a good quality-price ratio. The sale is aimed at customers interested in a balanced mix of quality foods that can be touched, sniffed, chosen, known in each aspect and prearranged.

**TROPICAL GREENHOUSE**

Inside the multi-purpose building, a warm and humid environment has been recreated, with temperatures never falling below 15° C in winter and not exceeding 32° C in summer. It houses a collection of plants coming mainly from the American and Asian continents that wants to represent the forms and composition of the tropical and equatorial environments. You can admire orchids, bromeliads, cycads, ferns, palms and ficus. There are also some specimens of Nephentes, a carnivorous plant that has evolved some goblet-shaped structures for the capture of insects.

The greenhouse houses some plants used since ancient times by man for their needs, you can see the pepper plant (Piper geniculatum), the banana tree (Musa basjoo), coffee (Coffea arabica). There are also numerous specimens of cotton (Gossypium herbaceum), considered the most important textile plant in the world used by man, which can produce fertile useful seeds.

**OUTDOOR SPACE**

In the intervention space thematic areas will be developed, assuming the principles of chromotherapy, which is considered a form of energy and therefore emanator of specific properties able to have effects on the functioning of the organism, therefore in each area the plant essences based on their flowering color will be planted.

- Open space (fruit trees - sublimation of human consciousness)

Species: Crataegus azerolus, Ficus carica, Laurus nobilis, Malus domestica, Prunus avium, Prunus domestica, Prunus persica, Pyrus communis

- Outdoor gym (yellow - exudes energy and eliminates toxins)

Species: Nassella tenuissima, Foeniculum vulgare, Rosa spp, Santolina rosmarinifolia

- Music zone (indigo - relaxing faculties)

Species: Echinops ritro, Lavandula dentata, Rosmarinus Tuscan blue, Salvia azurea, Salvia haematodes, Salvia virgata, Verbena bonariensis

- Botinacal garden (aromatic and officinal plants - stimulation of the senses)

Species: Achiellea millefolium, Centranthus ruber, Echinacea pupurea, Foeniculum vulgare, Lavandula dentata, Lavandula officinalis, Lavandula stoechas, Malva moshata, Rosa spp, Rosmarinus officinalis, Rosmarinus Majorka Pink, Rosmarinus Tuscan blue, Salvia argentea, Salvia azurea, Salvia coccinea, Salvia grhamii, Salvia greggii, Salvia haematodes, Salvia horminum, Salvia officinalis, Salvia virgata, Santolina rosmarinifolia, Teucrium fruticans, Thymus vulgaris, Verbena bonariensis

- Meditation zone (green - exudes sense of balance and harmony)

Species: Miscanthus sinensis, Pennisetum alopecuroides, Stipa tenuissima, Thymus vulgaris

- Sports hall (red - increase of inner energy)

Species: Knautia macedonica, Muhlenbergia capillaris, Sedum spectabile, Centranthus ruber, Echinacea pupurea, Salvia coccinea, Salvia grhamii

- Fitness (yellow - gives off energy and eliminates toxins)

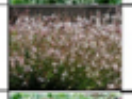
Species: Gaura lindheimeri, Myrtus communis, Miscanthus sinensis, Nassella tenuissima Pennisetum alopecuroides, Stipa tenuissima, Achiellea millefolium, Santolina rosmarinifolia

- Physiotherapy (blue, violet - anti-inflammatory and analgesic faculties)

Species: Echinops ritro, Lunaria annua, Lavandula dentata, Lavandula officinalis, Lavandula stoechas, Rosmarinus officinalis, Rosmarinus Tuscan blue, Salvia azurea, Salvia haematodes, Salvia officinalis, Salvia virgata, Teucrium fruticans, Verbena bonariensis.

At the center of the whole system is the Platanus occidentalis, a monumental tree resistant to the smog of urban areas, which in our project symbolizes life.

## VEGETATION TABLE THEMATIC AREAS

| TREES | | flower | | | | |
|---|---|---|---|---|---|---|
| species | family name | | winter | spring | summer | autumn |
| Crataegus azerolus | Rosaceae |  | | | | |
| Ficus carica | Moraceae |  | | | | |
| Laurus nobilis | Lauraceae |  | | | | |
| Malus domestica | Rosaceae |  | | | | |
| Prunus avium | Rosaceae |  | | | | |
| Prunus domestica | Rosaceae |  | | | | |
| Prunus persica | Rosaceae |  | | | | |
| Pyrus communis | Rosaceae |  | | | | |
| **SHRUBBERY AND HERBACEOUS** | | | | | | |
| Echinops ritro | Astreraceae |  | | | | |
| Gaura lindheimeri | Onagraceae |  | | | | |
| Knautia macedonica | Dispacaceae |  | | | | |
| Lunaria annua | Brassicaceae |  | | | | |
| Myrtus communis | Myrtaceae |  | | | | |
| Muhlenbergia capillaris | Graminaceae |  | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Miscanthus sinensis | Poaceae |  | | | | |
| Nassella tenuissima | Poaceae |  | | | | |
| Pennisetum alopecuroides | Graminaceae |  | | | | |
| Sedum spectabile | Crassulaceae |  | | | | |
| Stipa tenuissima | Graminaceae |  | | | | |
| **AROMATIC AND OFFICINAL PLANTS** | | | | | | |
| Achiellea millefolium | Asteraceae |  | | | | |
| Centranthus ruber | Valerianaceae |  | | | | |
| Echinacea pupurea | Asteraceae |  | | | | |
| Foeniculum vulgare | Apiaceae |  | | | | |
| Lavandula dentata | Lamiaceae |  | | | | |
| Lavandula officinalis | Lamiaceae |  | | | | |
| Lavandula stoechas | Lamiaceae |  | | | | |
| Malva moshata | Malvaceae |  | | | | |
| Rosa spp | Rosaceae |  | | | | |
| Rosmarinus officinalis | Lamiaceae |  | | | | |
| Rosmarinus Majorka Pink | Lamiaceae |  | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Rosmarinus Tuscan blue | Lamiaceae |  | | | | |
| Salvia argentea | Lamiaceae |  | | | | |
| Salvia azurea | Lamiaceae |  | | | | |
| Salvia coccinea | Lamiaceae |  | | | | |
| Salvia grhamii | Lamiaceae |  | | | | |
| Salvia greggii | Lamiaceae |  | | | | |
| Salvia haematodes | Lamiaceae |  | | | | |
| Salvia horminum | Lamiaceae |  | | | | |
| Salvia officinalis | Lamiaceae |  | | | | |
| Salvia virgata | Lamiaceae |  | | | | |
| Santolina rosmarinifolia | Asteraceae |  | | | | |
| Teucrium fruticans | Lamiaceae |  | | | | |
| Thymus vulgaris | Lamiaceae |  | | | | |
| Verbena bonariensis | Verbenaceae |  | | | | |

## CITY FUNCTIONALITY

## SOCIAL VALUE

### Potential visitors

Conegliano is a city in the province of Treviso in Veneto region with about 35.000 inhabitants in the *comune* (2018). The society comprises mainly of middle-aged and elderly people; the average is about 47 years of age. There are 52 schools in the *comune* that gives about 3500 students. It is located at 28 km from the city of Treviso (20 min) and 57 km from one of the most visited places in the world - Venice (1h). All the attractions of Health Senses Path and its vertical farm with hydroponic system have the potential base in which it can develop and serve locals as well as many tourists. It will be a wonderful place for families with children, the elder, but also for groups of school children, students, even researchers and scientists or simply tourists.

### Economy

Thanks to many diverse facilities with services, HSP will be a hub for local economy as well as an important retail place in the region. The produce from the vertical farm and other sources – vegetables, herbs, greens – may be sold directly in front of the main building where a market is projected with up to 120 posts (direct access from the north). The market is not designed exclusively for the products from the urban farm, but also for the incoming retailers, farmers, etc. On the contrary, organic shop situated in the ground floor of the building in the south is a place for selling products from the site, i.e. supplements, cosmetics and perfumes. Outdoor bars, specifically the one in the open space in the northern part of the park, will offer the visitors coffee and tea of wide range of quality products from outside of the urban farm. Outdoor gym, fitness and physiotherapy facilities together with sports hall and saunas will constitute a large competition for several health centres or gyms already present in the city of Conegliano. Existing swimming pools and sport centres portray the demand for physical activity of the inhabitants. The future and the locals' practice will show if it poses a threat as a competition for the neighbouring supermarket being a food supplier, too.

The place will yield employment for a few tens of various careers workers: administration, educators/guides, scientists, a chef and other restaurant workers, a librarian, sport and fitness coaches, physiotherapists, retailers, technical workers, guards, cleaning staff. Not less importantly, it can constitute an encouragement for volunteers in much of the basic work needed.

### Education

HSP is, in its ideology, mainly aimed at educating people about a healthy lifestyle with all responsibilities and consequences related to it. It is possible by encouraging them to discover some interesting and pragmatic novelties they can make use of in their everyday lives by learning more about prevention (a well-balanced diet), natural therapies and detoxification (e.g. phytotherapy, sauna). One can also learn about the process food is generally grown in and basic information about urban farm concept. At the departure for the walk all points of the paths are explained. There are also educating boards throughout the park to actively take part in the path's elements and gain awareness about a healthy lifestyle. An important point is a restaurant with direct supplies, among others, from the urban farm. Consequently, there are going to be some cooking classes just next to the restaurant which will try to enhance a better in quality and a balanced diet. There is also a spacious library inside, focused thematically on agriculture, ecology, medicine, biology and chemistry, psychology, dietetics, physical education, spirituality or related fields. Visitors can also watch the work in a laboratory and sometimes try doing experiments, etc. with the scientists to know what goes on backstage. They are also shown working of supplements, cosmetics and perfumes production plants. The closest possible look at species, also used in the above-mentioned productions might be taken in a botanical garden with e.g. medicinal herbs or edible flowers, a very long and high tropical greenhouse and green roof. There, volunteers may work with the produce they may later harvest for their own needs. In other places, wherever some basic help is needed, volunteers are encouraged to have their say in HSP.

### Accessibility

The parcel is in exact centre of the town, close to train station and 500 m away from the historic centre. This place is on the flank of a hill that can be admired from a green roof

on two parts of the renovated main building complex. One entrance is at the north, very close to a bus stop and train station and directed to the historical central piazza. Before the entrance is clearly visible, there is the market which is a kind of an introduction and representation of the produce grown behind. There are a few entrances from the east to the parking space with 202 parking lots for cars and 10 for buses/coaches. One can also reach the organic shop from an eastern entrance. The main entrance to the main complex is designed from the south where a green wall is constructed. Four gates on the southern border of the parcel may lead either to the main complex or the park itself or further to a sports hall with saunas. This hall can function as an individual building utilised for sport needs. It has its own parking space with 74 parking lots for cars and 2 for coaches. Obviously, the park may also be reached by the latter entrance. Just on the two parking spaces there might be (a maximum of) almost 2 thousand people parked. Inside the park, also physiotherapy facility and fitness facility are in a form of isolated buildings. Such a configuration of entrances and a quite complicated net of paths in organic shape enable local people to walk through the 'green heart' of Conegliano (mainly in southern-northern direction) as well as riding a bike through it or making a route inside.

There is a specific programme of HSP but it is so rich and easy to change during the walk that there will be always some new experiences to be faced with. That is why the place is going to attract not only new visitors but also ones that have already been there. The path can always be rearranged according to one's needs, will or free time at disposal.

**Socialisation opportunities**

One of the characteristics of this project is multifunctionality which renders many requirements but, first and foremost, creates multiple opportunities. An important aspect of a public park is possibility to socialise. HSP provides visitors with many such places to develop social or familial bonds. Starting with indoor activities, people can interact in the restaurant, but especially during healthy cooking classes and during voluntary work or admiring views on the green roof. The majority of excuses for social interaction is outdoor, though. Be it a bench close to an intersection of some paths or close to a pond. There are some tables with benches in the vicinity of the water that can well function as meeting place for groups of friends or family, for instance, playing board games. An open space near the western entrances to the hall and the dining part is another good example of a public space. There are cafés, bar, tables and chairs, fountains, benches and paved zone with lots of trees around. The northern ramp adds to its attractiveness and vividness. It is second most important piazza in the park, as it is in the juncture of many paths and directions and it also is a space in front of the western entrance of the complex, not far from the northern entrance to the park. Outdoor gym might, as well, be an exemplification of a place for interaction. It displays also another social value, mainly psychological feeling of being useful for the HPS (and society, consequently) because the equipment is enriched with energy generators enabling producing electricity power from one's muscles. Thanks to voluntary physical effort, some portions of energy are used on site at the same time, letting people to have their personal and direct contribution to the work of the park in an innovative and attractive manner. They can also charge, e.g. their smartphone with the equipment and experience the difficulty of electricity production by their physical strength. Fitness hall is also, definitely, a space for people's interaction. Similarly, four-court size sports hall for many sports disciplines and even saunas. Anyways, the central square is envisioned for socialisation specifically. A platanus is going to grow in the middle of the central piazza. It features an amphitheatre directed to the platanus with an audience on four stairs housing about 100 spectators. There is also a playground next to a mist fountain and a small open space with a water blade in the background. Some curved benches facilitate and permit to sit down together in a group.

**ENVIRONMENTAL VALUE**

**Ecology education and implementation**

HSP is a great lesson of ecology and living in accordance with nature. From the very beginning of HSP, first theoretically, participants learn what is ecology and what are its aims. Then, along the walk full of various experiences, they see many actions practically embodied in life. It has some important contribution to education of society, not only children, for whom gaining knowledge is forward-looking, but also adults, who have – in their mass – a real influence on the present state of their part of the world. They all see some examples showing that a life "closer to nature" is going to benefit from nature and vice versa. Working of such a facility as HSP with numerous sustainable and innovative concepts

will prove their relevance and validity also for particular people and families as private persons.

The facility will implement recycling strategies and waste management. Not only will the waste be sorted, but also biological one will be utilised as a soil conditioner for the park in a compost part of the complex. The organic waste from HSP, together with the waste from local farmers and entrepreneurs can also constitute a biomass for sustainable energy conversion. Moreover, stormwater management is planned that makes use of the dirty water on the ground, mainly paved paths and parking spaces. It can be used for flushing toilets and irrigating the landscape. This also results in a well-managed state and shape of the soil in the park. The paths and piazzas are to be placed with a drainage system and appropriate tiles or cobblestone. Furthermore, direct rainwater is going to be collected in containers, so that it can be used, e.g. watering plants in the park.

Participants in HSP are offered a wide array of quality products from the vertical farm – mainly in the restaurant and bars – and processed ones – either officially "organic" or simply of a high quality: supplements, cosmetics and perfumes. The green roof provides the visitors with an admirable view on the park and the rest of Conegliano, but is, as well, a place for volunteers to work by themselves in the garden and enjoy the fruit of their work. The restaurant will be supplied with fresh food also from school gardens replenishing the soil with crop rotation.

An aquaponic system will be the basic concept for the vertical farming in HSP that achieves a balance in a complete eco-system. This combination of aquaculture, i.e. raising fish (such as goldfish, tilapia) and hydroponics, i.e. the plants growing without the soil is a very attractive and innovative way of growing food and raising fish. The plants are fed by the organic waste from the fish. The system starts after about a month, when a colony of nitrifying bacteria is developed.

Last but not least, HSP encourages visitors – particularly by other people using it – to benefit from a sustainable means of transport. For cyclists, the park may be only an interesting stop on a longer route, but a destination for cthem, too. There are bicycle parkings in the park – near the northern and the southern entrance. Also, a new column for electric vehicle charging is envisioned in the eastern parking space for cars. It develops and conforms to the existing net of electric vehicle charging stations in Conegliano, which are four and situated from 1 to 1.5 km from the project parcel.

**Biological diversity**

HSP is based on multifunctionality but also biological diversity. It tries to conform to the ecosystem and create also an added value. Apart from all the species inside the vertical farm such as herbs, greenery or vegetables and all the tropical species in the greenhouse, there are numerous plant species outside. First of all, the park is abundant in tree species with the most iconic, central platanus in the main square. There is also an ample range of flower species of various colours and scents. Some herbs, greenery and fruits are symbolically put in the main square, too, where they may act as an invitation of preface for two of the 5 senses categories arranged in spiral arms (taste and smell). Another species, best for humid conditions, are in and around the pond. There may also swim fish. Another animal class species are birds. Many birdhouses are to be hung on the trees in the park. Together with a knowledgeable feeding it will attract many bird species that will create with their twitter a pleasant atmosphere for the incoming people. The fertilisation of the soil in the park by earthworms will be maintained and enhanced. Other common, small animal species can be also described in the educating boards throughout the park.

**Energy supply**

HSP is projected as an environmentally and economically sustainable facility, which in practice, nowadays, means using renewable sources of energy. HSP is going to use (ultimately, in the future) four sources of renewable energy production that should cover majority of its energetic and electrical power needs.

The first and least efficient is the equipment for outdoor gym that has energy generators converting physical effort from human muscles into electric power. The majority of the power is going to be spent by the users, as there are USB plug-ins enabling to charge mobile devices.

The second energy source, a biomass-fired power plant may be activated a few years after the opening of HSP. Agricultural crops and waste materials from the outside suppliers, but more importantly from HSP itself can be burned as fuel or only converted to liquid biofuels

that can be burned later and become a product for sale. The electric power may be drawn from burning garbage, such as food and yard waste. This can be converted to biogas, similarly to animal manure (possible outside suppliers) and even human sewage from the building complex.

The third electric power source is the system of wind turbines assembled on some of the roofs of the building complex. This system is producing only marginal and not constant energy but is complementary for the main energy source.

Solar panels would make the majority of energy taken from renewable sources. The roofs of about a third of the main building complex surface are already oriented in a perfect, southern direction with the angle of 26.5°, for the latitude of Milano (45°) the full year angle equals 37.3° which reaches 71% of optimum (the optimum is when the angle is adjusted: in winter bigger 15° and in summer smaller 15°). Thus, the panels incorporate in the shape of the tilted roofs.

Besides, the facility will benefit from the large greenhouse producing more heat for the adjacent building's parts. The existing clerestory windows along some buildings decreases its energy needs. The buildings have to be equipped with natural ventilation systems and operable windows.

## ECONOMIC FEASIBILITY AND SUSTAINABILITY

**Descriptive report for the technical-economic feasibility of the ideational proposal**

The present economic-financial report summarizes the economic feasibility of the intervention, starting from a rough estimate of the costs. The intent is to demonstrate the economic sustainability of the intervention, through a program of amortization over time of the initial expenditure.

| PROJECT ECONOMIC FRAMEWORK | | | |
|---|---|---|---|
| A) WORKS | | | |
| 1) to body | | 34.150.000,00 | |
| a) BUILDING RESTRICTION | | 20.000.000,00 | |
| b) PHOTOVOLTAIC SYSTEM | | 1.150.000,00 | |
| c) BIOMASS SYSTEM | | 1.000.000,00 | |
| d) GREEN SPACE | | 12.000.000,00 | |
| **A.1)** AMOUNT OF WORKS | | **34.150.000,00** | |
| **A.2)** charges Safety coordination plans not subject to discount | | 1.024.500,00 | |
| **TOTAL WORKS (A1+A2)** | | 35.174.500,00 | **35.174.500,00** |
| **B)** SUMS at DISPOSITION | | | |
| a) surveys and geological reports | 30.552,53 | | |
| b) site surveys | 31.928,55 | | |
| a) planning | 1.707.500,00 | | |
| b) work management | 683.000,00 | | |
| c) accounting | 68.300,00 | | |
| d) safety coordination during the design phase | 102.450,00 | | |
| e) safety coordination during the execution phase | 170.750,00 | | |
| i) social security contribution (4%) | 109.280,00 | | |
| l) IVA on technical costs (22% of the total) | 625.081,60 | | |
| Technical costs | 3.466.361,60 | 3.466.361,60 | |
| Expenses for administrative acts | | | |
| a) static testing | 23.946,41 | | |
| b) administrative testing | 63.857,09 | | |
| c) social security contribution (4%) | 3.512,14 | | |
| d) IVA on consultancy fees (22% of the total) | 18.263,13 | | |
| Expenses for analysis and testing | 109.578,77 | 109.578,77 | |
| IVA on works at the rate of | **10%** | 3.517.450,00 | |
| B) TOTAL SUMS at DISPOSITION | | 7.093.390,37 | **7.093.390,37** |
| TOTAL AMOUNT PROJECT Euro | | | **42.267.890,37** |

The building will become an indoor system that will use energy, material, space and work in a sustainable way:

**Zero Emissions:**

The renovation of the building is based on the integration of technologies for the production of energy from renewable sources of energy, making it sustainable and autonomous in terms of its energy needs, reducing the emissions produced.

**Zero Waste:**

- Adoption of the carbon cycle and water cycle systems using the own biomass and the biomass produced by the small and medium-sized farms of the Municipality of Conegliano, for the production of electricity and for the heating of sanitary water. In addition, the burnt combustion gases are used as fertilizer through direct greenhouse (enrichment through CO2);
- purification and enrichment of internal gray waters, together with external ones, nourishing consoles that come from the biomass digester by using them for irrigating greenhouses. The steam of the irrigation water is condensed to receive it to be readmitted in the cycle;
- The building is a logistical infrastructure with the aim of allowing small-medium-sized local farms to reduce costs and create synergy between producers and industry;

**Zero Pesticides:**

- does not require chemical products for growing plants, with large-scale savings of pesticides and herbicides;
- ensures compliance with the basic ecological conditions, production and its transformation;
- lays the foundations for creating the conditions for the concept of health to be an objective pursued as an element of prevention and safety.

**Zero Power:**

The building is designed to be completely autonomous from the energy point of view. In fact, the integration of technologies that exploit renewable sources in the building components of the building is envisaged: the roof, exposed to the south, will be photovoltaic for a total area of 8,000 m2 for a power of 1 MW and in part a green roof;
A plant for the use of biomasses of 200 KW can contribute to the energy efficiency of the system.

**Zero Distance:**

The building integrates the entire supply chain, from production to marketing of products and the enhancement of culture and tourism in the area, becoming the engine for an integrated value chain.

The result will be a multi-level eco-sustainable building that integrates, in a single structure, the entire supply chain, starting from the indoor production, to the marketing of products, the enhancement of culture and tourism in the area, the promotion of wellbeing and health, becoming the economic engine of places.

INSTALLATIONS

1) Cogeneration plant: COST EURO 1,000,000.00

200 KW biomass, able to produce 196 kW / h of electricity. This plant would allow the production of energy (electrical and thermal) in a renewable way, not increasing the CO2 in the atmosphere, and thus making a positive impact on the environment.

Hours of operation at full load 7,500 hours / year

Annual consumption Wood chips 2,100 tons / year

Annual energy production:

Gross electric power 1,350,000 kWh / year

Electricity consumed 150,000 kWh / year

Net electricity 1,200,000 kWh / year

Total thermal energy produced 3,000,000 kWh / year

Thermal energy used for drying Biomass 900,000 kWh / year

Thermal energy available 2,100,000 kWh / year

Annual operating and maintenance costs 161.150 € / year

Savings:

Electricity savings € 294,329 / year

Thermal energy saving € 50,400 / year

Total € 344,729 / year

Operating profit for energy savings 183,579 € / year

2) Photovoltaic system: COST EURO 1.150.000,00

1MW, able to produce 750.000 kW / h of electricity.

Annual electricity production 1.150.000 kWh / year

Annual maintenance costs 10.350 € / year

Costs Replacement of inverter 10th year € 230,000

Costs Disposal at the 25th year € 86,250

Electricity savings € 282,065.30 / year

Operating profit for energy savings € 271,715.30 / year

Savings Profit Lifecycle 25 years Euro 6.476.632,50

The Scenario Base provides an influx of 300,000 visitors in the first year of opening. The average hypothesis could lead to 500,000 thousand visitors. The expected, ample and complex catchment area will include different categories of visitors:

- Restaurants;
- Tourists;
- Educational visits;
- Events, Training, Congresses.

On the occupational level, it will bring 40 direct jobs, which will rise to around 160 considering the related industries.

Estimated time of realization (time schedule)

January 2019: elaboration of the first concept for the enhancement of the area.

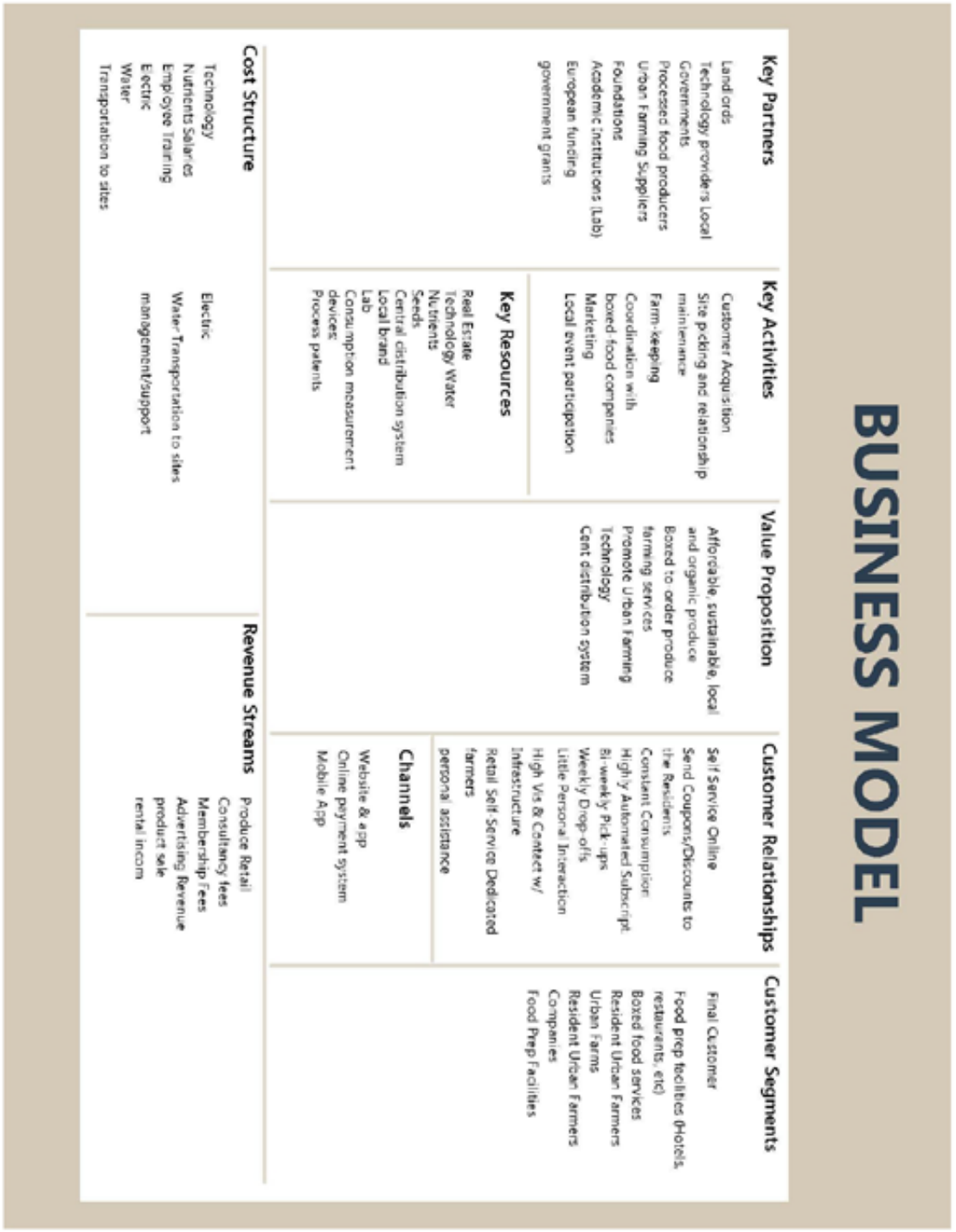
March 2019 - December 2019: development of the final project.

January 31, 2020: the City Council of Conegliano approves the project.

2020 - Authorizations Authorities in charge of the services conference

2021 - first half 2022: renovation work on the building complex, building works and plant engineering

September 2022: opening.



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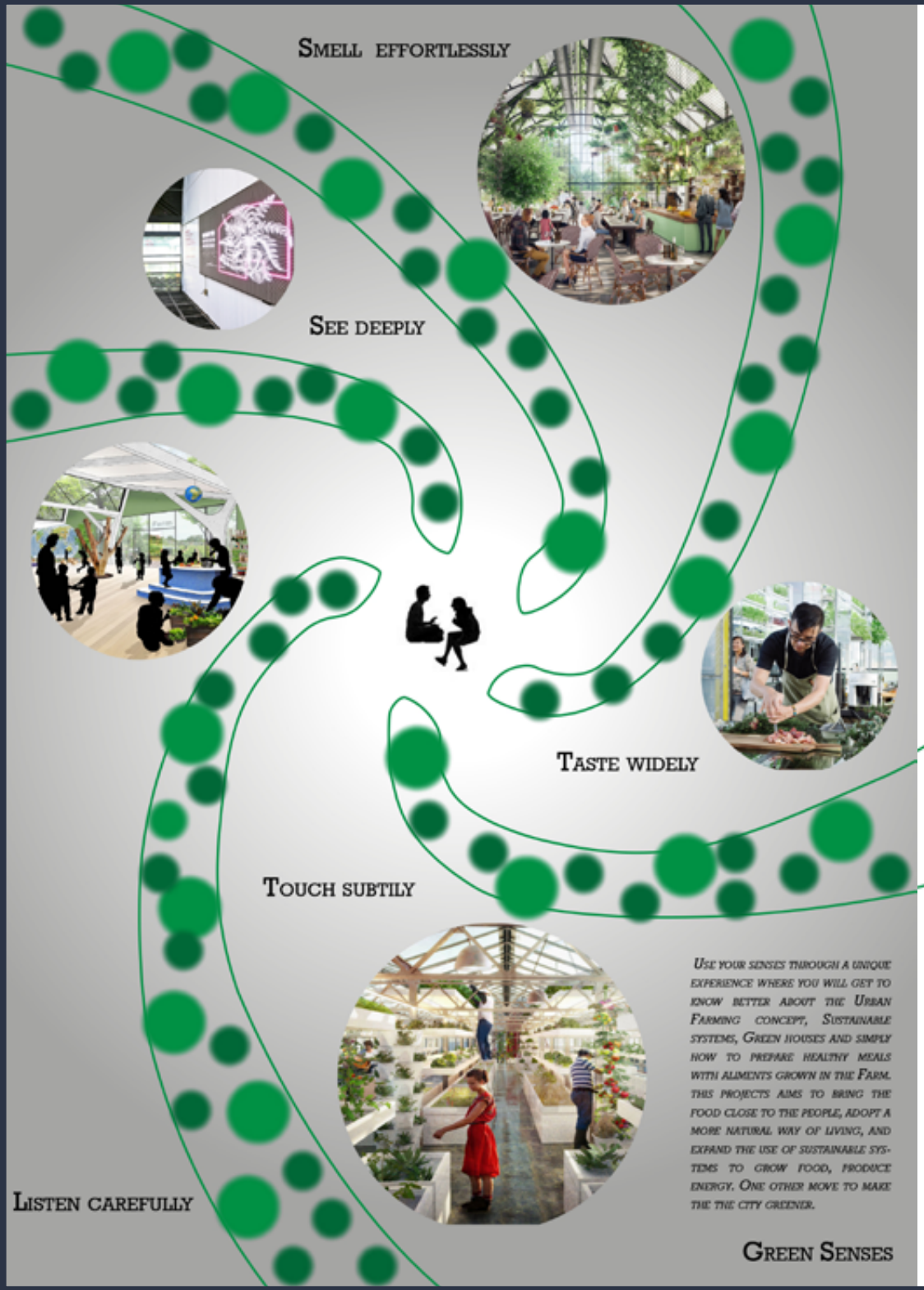
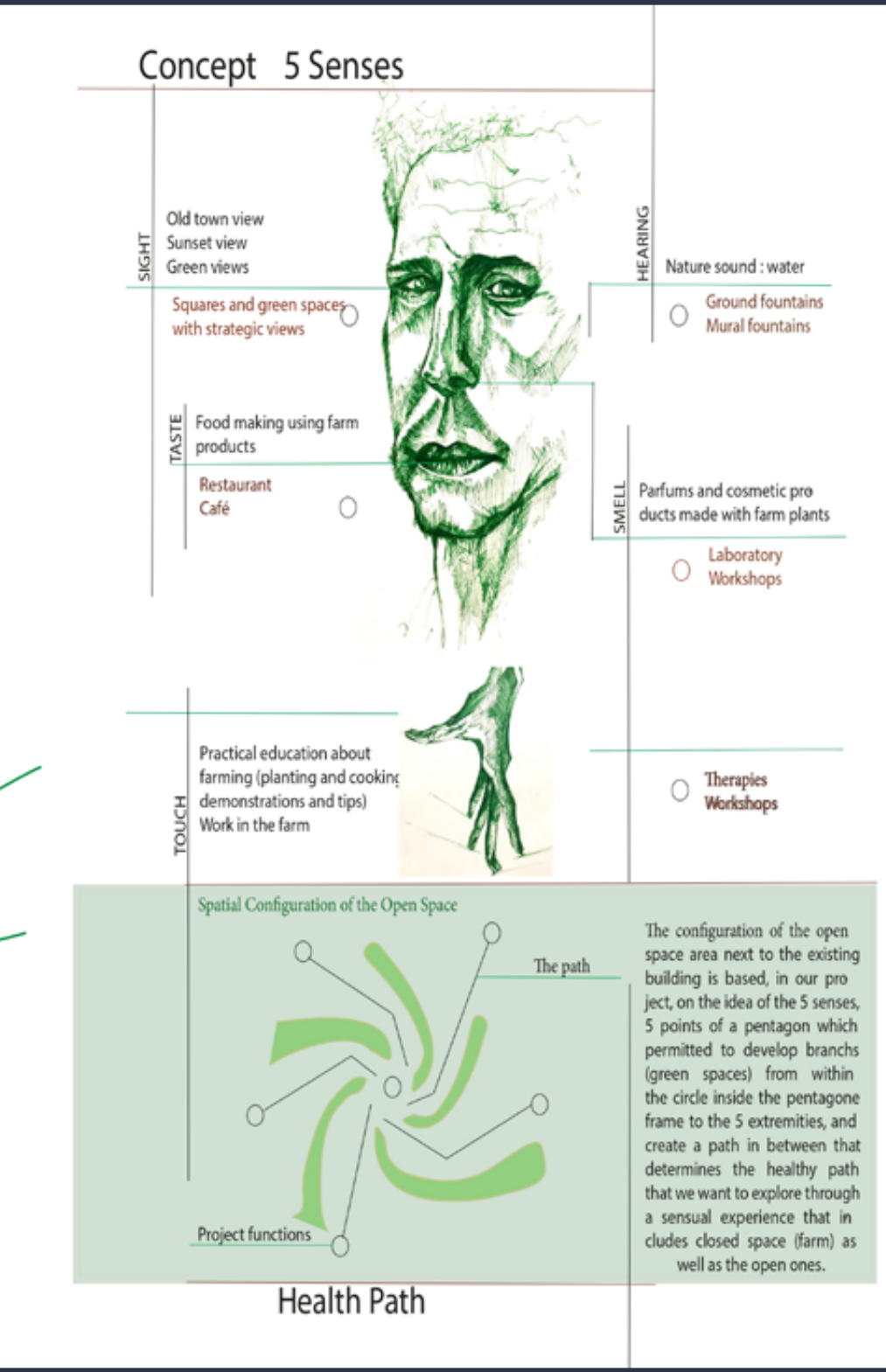
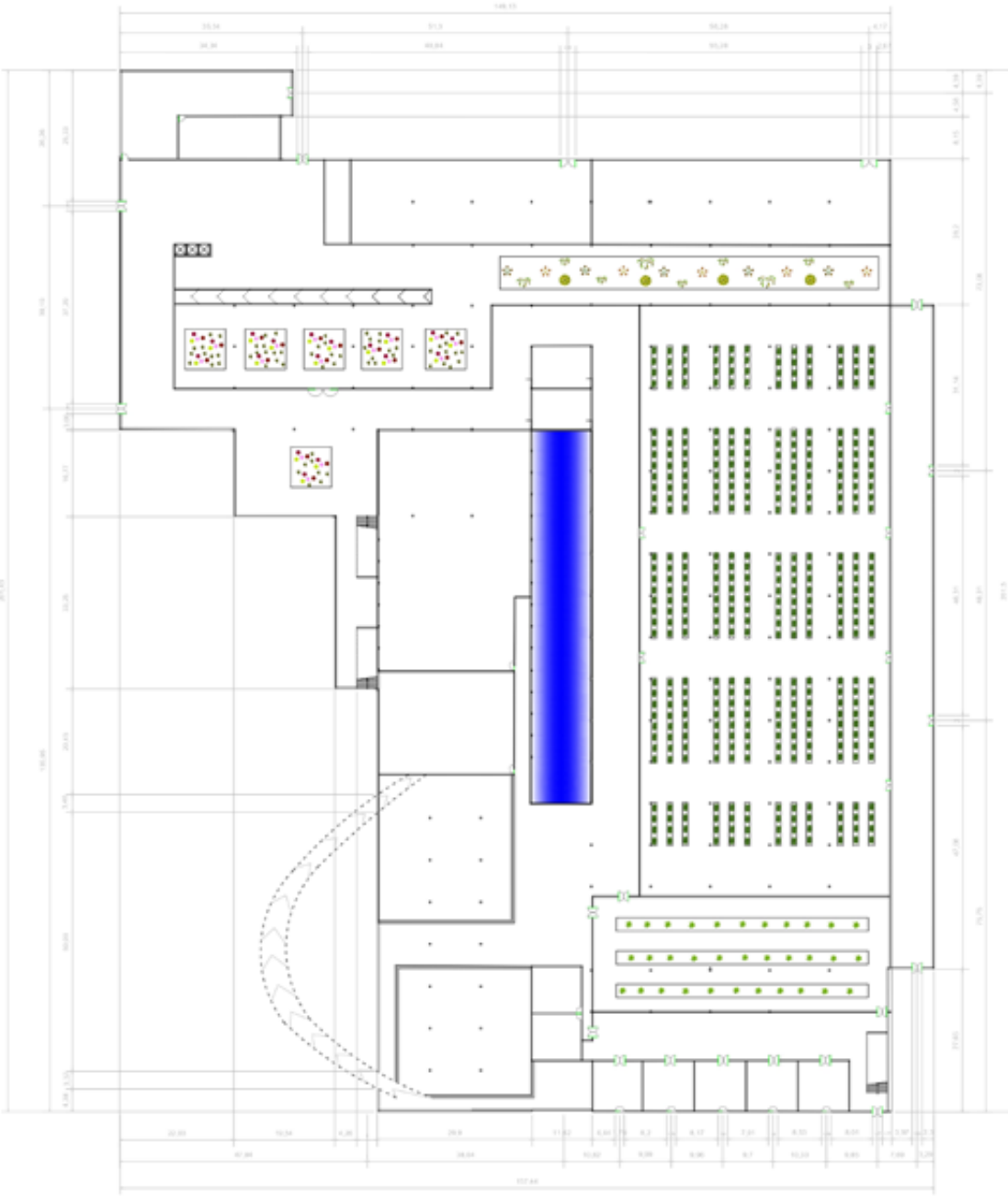

SMELL EFFORTLESSLY
SEE DEEPLY
TASTE WIDELY
TOUCH SUBTILY
LISTEN CAREFULLY
USE YOUR SENSES THROUGH A UNIQUE EXPERIENCE WHERE YOU WILL GET TO KNOW BETTER ABOUT THE URBAN FARMING CONCEPT, SUSTAINABLE SYSTEMS, GREEN HOUSES AND SIMPLY HOW TO PREPARE HEALTHY MEALS WITH ALIMENTS GROWN IN THE FARM. THIS PROJECTS AIMS TO BRING THE FOOD CLOSE TO THE PEOPLE, ADOPT A MORE NATURAL WAY OF LIVING, AND EXPAND THE USE OF SUSTAINABLE SYSTEMS TO GROW FOOD, PRODUCE ENERGY. ONE OTHER MOVE TO MAKE THE THE CITY GREENER.
GREEN SENSES


Concept 5 Senses
SIGHT
Old town view
Sunset view
Green views
Squares and green spaces with strategic views
TASTE
Food making using farm products
Restaurant
Café
TOUCH
Practical education about farming (planting and cooking demonstrations and tips)
Work in the farm
HEARING
Nature sound : water
Ground fountains
Mural fountains
SMELL
Parfums and cosmetic pro ducts made with farm plants
Laboratory
Workshops
Therapies
Workshops
Spatial Configuration of the Open Space
The path
Project functions
The configuration of the open space area next to the existing building is based, in our pro ject, on the idea of the 5 senses, 5 points of a pentagon which permitted to develop branchs (green spaces) from within the circle inside the pentagone frame to the 5 extremities, and create a path in between that determines the healthy path that we want to explore through a sensual experience that in cludes closed space (farm) as well as the open ones.
Health Path

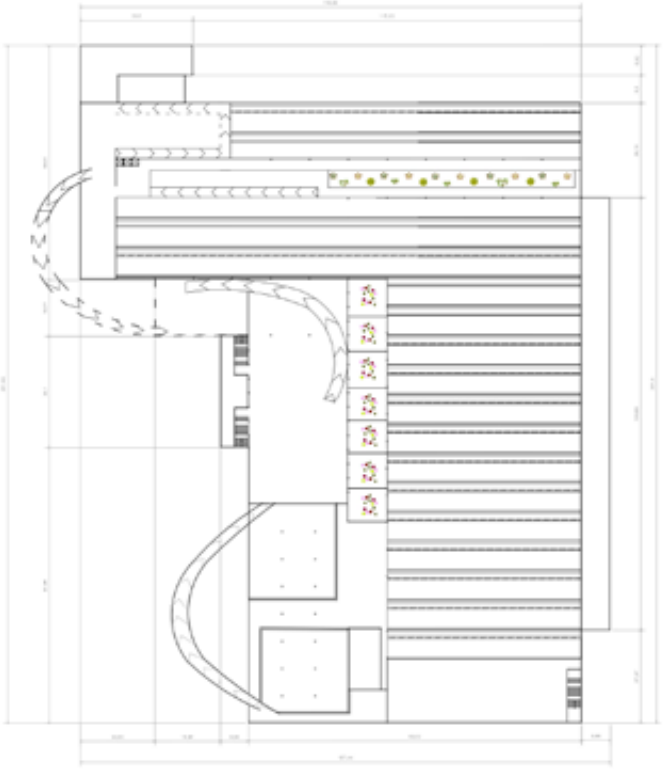
# MASTERPLAN

| | |
|---|---|
| SITE | CONEGLIANO ITALY |
| SUPERFICY AREA | 114640 m2 |
| BUILDING SPERFICY | 2472 m2 |

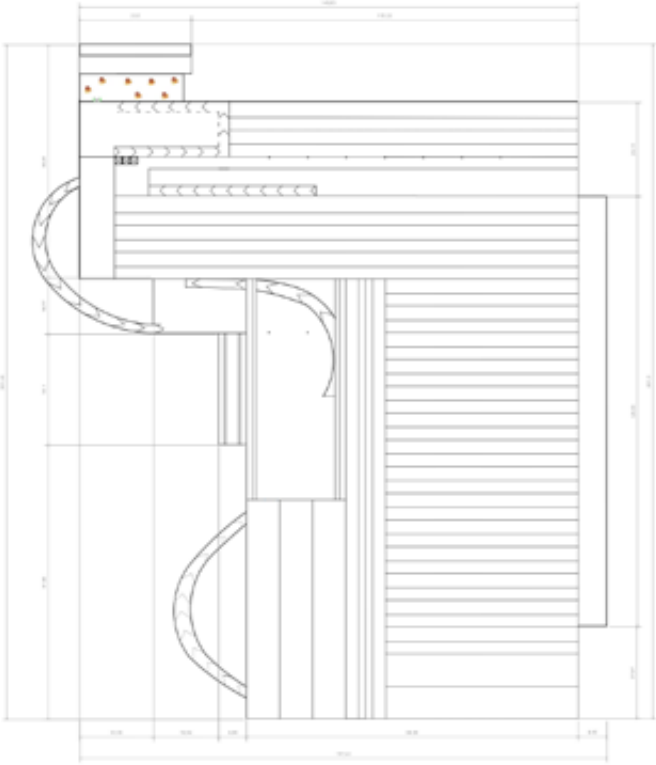


GROUND FLOOR

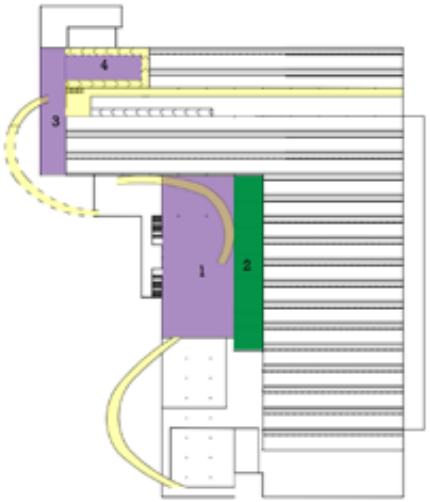
## SENSES THROUGH THE BUILDING

## FARM PRODUCTION STRATEGIES

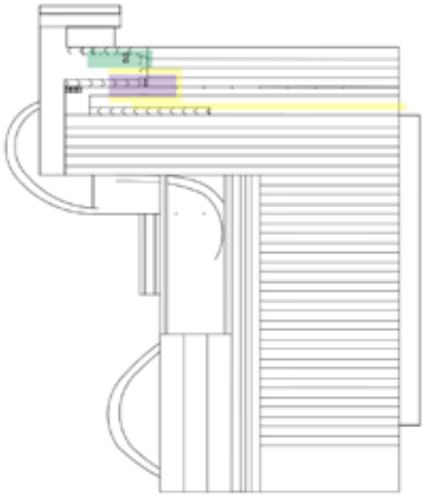
## FIRST FLOOR




Functions space
Planted Spaces
Circulation (Horizontal, Vertical)
Facilities

1 - Library -Reading room
2- Planting Boxes
3- Retaurant
4- Cooking space


## SECOND FLOOR



1- Cooking workshop
2- Accessible greenroof

# SUSTAINABILITY STRATEGIES

1 SOLAR ENERGY
Solar panels harvevst renewable sun energy, generating enough power to acheive a net positive energy goal.

2 GREENHOUSE
During the winter, the heat gain from the greenhouses transfers to neighboring spaces to reduce the overall energy load.

3 SEASONAL GARDENS
School gardens supply fresh food for the restaurant and food market, and replenish the soil through crop rotation.

4 STORWATER MANAGEMENT
Run-off from roofs and paving is collected and stored in a retention vault, to be used to flush toilets and irrigate landscape.

5 NATURAL VENTILATION
Openable windows allow for cross-breezes throught the building, providing greater user comfort while also reducing the building's energy.

1 WIND ENERGY
Turbins installed in the roof of the building generate electricity power complementing the solar panels.

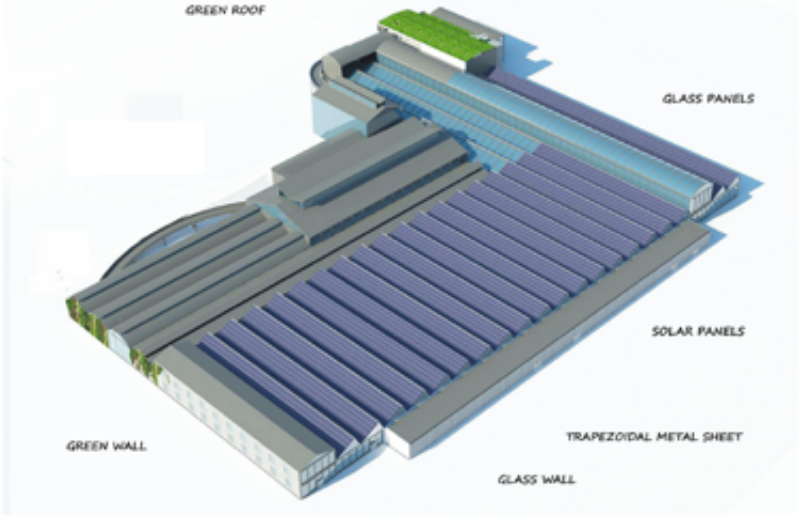
2 CLERESTORY WINDOWS
Strips of north and west- facing windows provide constant light across the building, reducing the building's energy load.

3 COMPOST
This process recycles various organic materials otherwise regarded as waste products and produces a soil conditioner (the compost).

4 HYDROPONIC SYSTEM
The fish waste provides an organic food source for the plants, and the plants naturally filter the water for the fish.

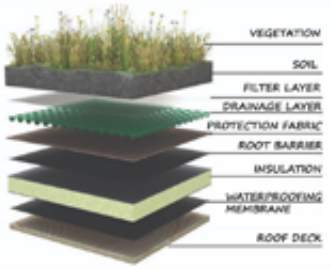
Perspective Section

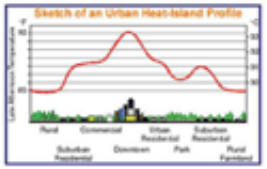
SYSTEMS IN THE BUILDING




## GREEN ROOF

Green roof retain rainwater and, together with plants, return a portion of this water to the atmosphere through evaporation and transpiration.
Benefits:
-reduce cost of building systems to take water




- In summer, the green roof protects the building from direct solar heat. In winter, the green roof minimizes heat loss through added insulation on the roof.

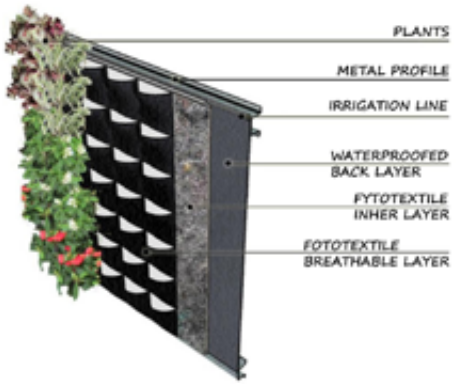
Less ground level ozone + less heat = less smog.

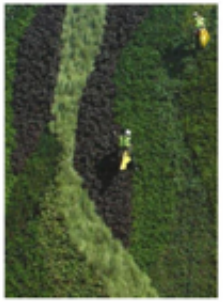
Reduced Urban Heat Island profile.

Less need for health care services result in societal cost savings.

## GREEN WALL

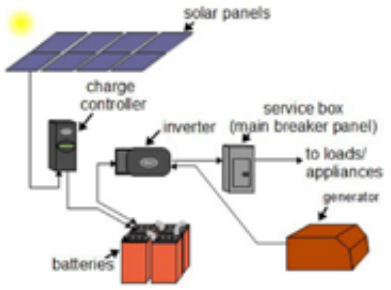
Reduces urban heat island effect and smog.
Cleans outside air of pollutants and dust
Acts as a sound proofing barrier.



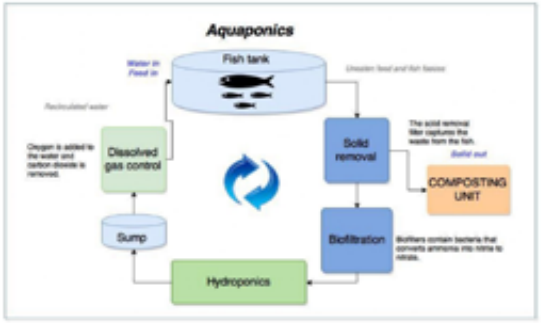



## SOLAR PANELS

In Conegliano building the roof of one hal is perfecty oriented to the south side with provides more sun light. Renewable clean power that is available every day of the year, even cloudy days produce some power.



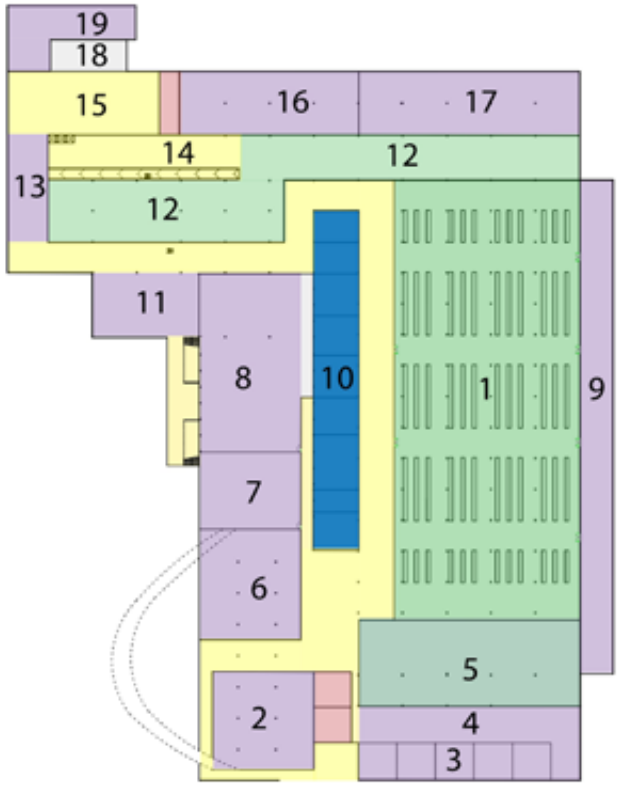
VIEW ON TROPICAL GREENHOUSE
– entrance from parking





HYDROPONIC SYSTEM

Functions space
Planted Spaces
Circulation (Horizontal, Vertical)
Facilities




Ground Floor

## MAIN BUILDING'S FUNCTIONS

1- Farm
2- Welcome and Information
3- Shops
4- Storage house
5- Green house for Education
6- Urban farming Education
7- Laboratory
8- Cosmetic factory
9- Technical supply
10- Aquaponics
11- Perfume space
12- Tropical space
13- Café
14- Exposition space
16- Incoming plants and products
17- Compost
18- Entrance
19- Administration

## VEGETATION TABLE THEMATIC AREAS

### TREES

| species | family name | winter | spring | summer | autumn | winter | spring | summer | autumn |
|---|---|---|---|---|---|---|---|---|---|
| *Crataegus azerolus* | Rosaceae | | | | | | | | |
| *Ficus carica* | Moraceae | | | | | | | | |
| *Laurus nobilis* | Lauraceae | | | | | | | | |
| *Malus domestica* | Rosaceae | | | | | | | | |
| *Prunus avium* | Rosaceae | | | | | | | | |
| *Prunus domestica* | Rosaceae | | | | | | | | |
| *Prunus persica* | Rosaceae | | | | | | | | |
| *Pyrus communis* | Rosaceae | | | | | | | | |

### SHRUBBERY AND HERBACEOUS

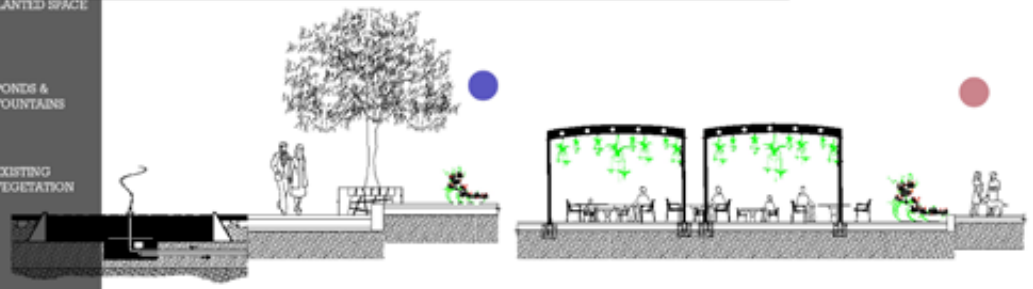
| | | flower | | | |
|---|---|---|---|---|---|
| species | family name | winter | spring | summer | autumn |
| *Echinops ritro* | Asteraceae | | | | |
| *Gaura lindheimeri* | Onagraceae | | | | |
| *Knautia macedonica* | Dispacaceae | | | | |
| *Lunaria annua* | Brassicaceae | | | | |
| *Myrtus communis* | Myrtaceae | | | | |
| *Muhlenbergia capillaris* | Graminaceae | | | | |
| *Miscanthus sinensis* | Poaceae | | | | |
| *Nasella tenuissima* | Poaceae | | | | |
| *Pennisetum alopecuroides* | Graminaceae | | | | |
| *Sedum spectabile* | Crassulaceae | | | | |
| *Stipa tenuissima* | Graminaceae | | | | |

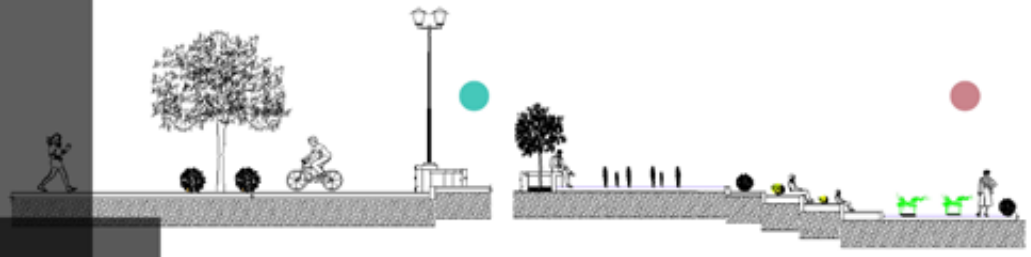
# MASTERPLAN - OUTDOOR FUNCTIONS

PLANTED SPACE

PONDS & FOUNTAINS

EXISTING VEGETATION





HEALTH SENSES PATH

PROGRAMME EDUCATION
- PRESENTATION OF URBAN FARMING CONCEPT
- PRESENTATION OF HEALTH SENSES PATH
- ECOLOGY
- LIBRARY
- EDUCATING BOARDS ON THE PATH
- HEALTHY COOKING CLASSES

RESEARCH
- LABORATORY
- MEDICINE, COSMETICS AND PERFUMES PRODUCTION PLANT
- BOTANICAL GARDEN WITH MEDICINAL HERBS, EDIBLE FLOWERS, TROPICAL GREENHOUSE

WORK
- VERTICAL FARM PLANT
- GREENHOUSES
- GREEN ROOF
- COMPOST

SOCIALISATION AND RELAXATION
- THE MAIN PIAZZA: AMPHITHEATRE, PLAYGROUND, BENCHES FOR GROUPS, MIST FOUNTAINS
- OPEN SPACE
- POND
- MUSIC SQUARE: MUSICAL FOUNTAINS

CONSUMPTION
- RESTAURANT
- CAFES
- OUTDOOR MARKET
- ORGANIC SHOPS

SPORT
- MULTIFUNCTIONAL SPORTS HALL
- "GREEN" OUTDOOR GYM (OR OUTDOOR GYM WITH ENERGY GENERATORS)
- FITNESS
- CYCLING AND WALKING ROUTES

THERAPIES
- DETOXIFICATION – SAUNAS (SPORTS HALL)
- PHYSIOTHERAPY – MASSAGES.


EAST ELEVATION

NORTH ELEVATION

SOUTH ELEVATION

WEST ELEVATION

# Phoenix

**with:**

## L'Azienda Zanussi

Ricardo Souza, Alan Silva, Stella Áurea, Hélder Santos

# Phoenix Team – Ex Zanussi Area (Conegliano)
# Proposal : La Azienda Zanussi

## 1. Total Concept

We've named this project LA AZIENDA ZANUSSI. Our proposal for the Ex Zanussi area in Conegliano, Italy consists in designing a sustainable building with high-quality food production, along with the use of renewable energy sources with different spaces to promote community bonding.

In the external areas, we've set up a park with native and low maintenance plants, creating an inviting and more colorful space, ideal for family walking, biking, skating and practice yoga. The cubicle floor can be transformed in a open theatre for host for cultural, artistical and entertainment events.

The old structure of Ex Zanussi Factory will be preserve due to its historical value. On the top of the building although, we've designed green roofs with some flowers beds to create the perfect spot to admire the beautiful city and to frame the Castelvecchio view.

The energy used will be 100% solar, with solar panels and Large Area Fluidic Windows technology. hat uses a fluid suspension of iron particles kept inside the window in a series of long vertical channels, which allows the window to change the opacity, in addition to absorb and distribute the heat in the environment.. Moreover, ilt'll be is able to capture sunlight and turn it into energy, which can be destined to internal cooling systems, that guarantees renewable energy generation andy and allow natural illumination indoors.
lighting

The bio-factory design has six cultivation systems. Which will use LED lamps along with temperature and humidity control systems to ensure the vegetable production throughout the year. Next to the bio-factory, we've designed a Culture Laboratory for the preservation and multiplication of the traditional and new varieties of winery grapes to produce the Prosseco traditional wine.

In the business area, we've designed an innovation hub (to support local initiatives and startups), and at the food corridor, we've placed spaces for restaurants, cafes, and bars, as a meeting point for the young people at night. The local entrepreneurs will be able to count on stores for traditional products such as wine, pasta, cheese and souvenirs, a must-see point for tourists. We've designed a special store for vegetable from our bio factory, with grown local and fresh products for companies and citizens.

For the cultural and entertainment scenario, we've designed a museum to preserve the Ex Zanussi's history, along with An art gallery to support the local artists. And a book store with old and recycled home appliances as a shelf to share books.

For social innovations, we've designed an app to promote the reduction of carbon emissions. You can create a profile and rent a bike or bring to the bio-factory fruits and vegetable wastes and accumulate points to change for food. You'll find tips for grown food and use the community garden for growing foods yourself.

That way we believe we can ensure the sustainability goals and create a profitable business model with our La Azienda Zanussi project and put Conegliano a steep forward to become the city of tomorrow.

## 2. Urban Farm Design

*2.1.Pre-location study*

The landscaping project was developed based on a set of regional data and the property of the deactivated Zanussi company, located in Conegliano (45 ° 53 '17" North, 12 ° 18 '18' East), province of Treviso, region of Veneto, Italy. The construction of floors, with window and columns of support. A long ramp leads to the first floor of the factory, where you can access a terrace, while you

can see most of the property's grounds. The site of the first station is located in the center of the city of Conegliano where, currently, it presents itself as idle space and, consequently, for drug users and marginal, bringing the feeling of insecurity by the idleness.

The climate of the region, according to the Koppen-Geiger, is the temperate oceanic type (Cfb) recorded by temperatures ranging from 0 ° to -3 ° C in colder periods and average values less than 22 ° C in most of the year With fresh and humid fresco, without any significant difference of precipitation is abundant and well distributed throughout the months.

The ground of the feeding presents / displays compacted soil and with little aspect fertile, plants of maintenance without maintenance and invasion of invasive plants. However, the state of conservation of the region consists predominantly of native species such as azimuth, cork, erica and arbutus. (Cyclamen repandum S.), clematis (Clematis vitalba L.), hedera (Hedera Helix L.), red foxglove (Digitalis purpurea L.) (Willow oleander L.), red willow (Salix purpurea L.), redwood willow (Salix purpurea L.), red willow (Salix purpurea L.) alder (Alnus glutinosa (L.) Gaertner), osmunda regal (Osmunda regalis Brullo), erica tirrenica (Erica terminalis Salisb), among others.

*2.2 Proposal*

The intervention proposal applies to a city with a wine tradition and with great industrial influence, the intervention area being a material and palpable reality of this historical moment of the place, in which there is a structure that dates back to the time. Thus, it is possible to bring the concept of Historical Present as the main axis of architectural intervention, a concept developed and applied by Lina Bo Bardi, an Italian-Brazilian architect, who considers the past as a creative and relational reality that interacts with the present, thus, it can only be assimilated to the individual and collective consciousness, starting from the relations existing between the historical memory and the continuous present, finding possibilities in the preexisting.

Bardi states that:

It is necessary to get rid of the "moorings", not simply throw away the past and all its history; what is necessary is to consider the past as a historical gift. The past, seen as a historical gift, is still alive, it is a gift that helps avoid clutters ... Faced with the historical present, our task is to forge another, "true" gift, and for this a deep knowledge of specialist, but an ability to understand the past historically, to distinguish what will serve new situations today that present themselves to you and all this is not only learned in books. [...] In practice, there is no past, what exists is the historical present. (BARDI, 1992, pp. 61-62). As we propose here with the rehabilitation of the existing structure in place, next to the combination for a contemporary structure, which has as its starting point the balance with the preexisting structure.

*2.3 Architectural Party*

Considering the relations of the past with the present and the whole concept of Historical Present, the intervention proposes the maintenance and the rehabilitation of the existing structure, adapting it to the uses anticipated by the program of operation of the biofactory, together with the construction of a new structure that, from its design, its creative technology and its materials, can mark the present time and differentiate itself from the past time, dialoguing and strengthening the relationship with one another. In this way, these two times materialized through the architectural structure will, together, give life to the biofactory and its diverse uses, which are characterized by their use restricted to public use (such as the wine laboratory, cultural activities and spaces of coexistence through an urban garden, potentially integrating the local community), coexisting, as well as the past and the present.

In order to do so, local climatic factors were considered (thermal, acoustic and

luminous comfort), as well as attention to accessibility and sustainability, from materials to space production and operation. The main intervention of the project, from the structure to the program, is the architectural, urban planning and social relevance.

*2.4 Choice of materials*

The choice of materials permeates the industrial party, aligned with the idea of a historical gift already mentioned. The choice was made by steel and glass, providing lightness and transparency, consolidating the pre-existing structure as a central element of prominence and connecting with the same and the industrial past of the place.

*2.5 Digital Manufacturing*

The digital manufacturing method of Parametric Design was chosen, which consists of developing geometric shapes from predefined algorithms and dialogues with the digital technologies of three-dimensional modeling in the field of architecture and urbanism. Through the parametric design, it is possible to align with the pre-fabrication logic of the materials, in addition to achieving darker shapes and more precise execution, together with the aesthetic value attributed to this type of fabrication. It is possible to say that, despite the availability of such technologies of digital manufacture for the architectural project, it is still a little explored reality in this constructive area. The digital manufacturing also brings the benefit of the facility to model and remodel, if necessary, being flexible from the design moment to the execution of the work, an aspect that fits perfectly to the biofactory project and its gardens and crops, dealing with live species may require changes during the process.

*2.6 Furniture*

As well as the design of the new building, the furniture and the bibs will be executed through the digital manufacture, making use of the technology of the laser cutter, sawmill and 3D printer. The garden design ramified by the design of the place will do the integration, bringing the experience of unity within the diversity to who will visit. the main materials used for making the furniture will be reforested wood, which in addition to bringing a natural and renewable element, conveys psychological comfort for its sense of life and integration into the garden.

*2.7 Zoning*

It was stipulated that the existing building area will house the most public uses possible, since this structure contemplates the memory of the city and, as such, needs to be relational. The predicted parametric structure will include the most restricted uses, such as courses, storage, administration, etc.

*2.8 Landscaping*

From the landscape perspective, the project proposes the use of techniques such as green roofs, vertical gardens, flowerbeds and afforestation for the requalification of both the exterior spaces in relation to the site of the factory, as well as within the building itself and the planned structures. In this way, following the first principles of sustainability, priority is given to the use of low to medium plant species, an irrigation system that optimizes the use and reuse of water, resources that allow the use of natural light, source and produce clean energy, as well as the use of environmentally sound and sustainable source materials.

*2.9 The New Biofactory Design*

The facade of the biofactory will assume a modern and harmonious design, maintaining, however, the basic structure of the building, for the new proposal of the place. The inspiration for the repagination of edification and new structures consists of features inspired by elements of nature such as the spontaneous geometry of crystals and rocks, as well as the organic lines of leaves, branches

and flowers. The materials used will be of reuse origin and ecologically certified raw material with low or no environmental impact.

*2.10 Vertical gardens, green roofs and "Sky planter"*

Vertical gardens and green roofs will be used as alternatives to cover and cover surfaces in a natural way using vegetation adapted to the proposed types of cultivation. The idea is to work with the different textures and colors of the vegetation, providing visual and environmental well-being, increasing visitors' contact with nature. The vegetation chosen mostly includes native species due to adaptability in the region and low maintenance.

Some exotic species will be used, however, in the indoor environments where there will be control of the environmental conditions of temperature, humidity of the air, irrigation and luminosity, allowing the year-round maintenance of the species. In indoor environments the vegetation will be arranged using vessels of different sizes and shapes at floor level, vertical gardens and the sky planter technique to enlarge the green cover within the spaces harmoniously. The proposal is to bring the vegetation element from the outside into the internal spaces, providing the improvement of the quality of the air, besides decorating the environments and making the visitors aware of the importance of this interaction with nature.
The maintenance will be carried out by means of an automated irrigation system, using as source reservoirs with water abstracted from the rain, for the best optimization of water use. In addition, residues generated during the maintenance of vegetation (dried leaves, pruned branches, flowers and nuts) will be used in the composting process for use in plant fertilization.

*2.11 Lighting*

Both indoor and outdoor areas will be illuminated with the use of LED lamps using clean energy sources generated from a solar radiation collecting system by means of photovoltaic panels. The lighting will be modern and harmoniously arranged, valuing the spaces and landscape elements, bringing the feeling of comfort and allowing the use of the place both during the day and at night time. Modern design of poles, light fixtures and beacons will be elaborated in a way that brings functionality and beauty to the environments.

*2.12 Accessibility*

Thinking about the access of people with special needs and difficulties of locomotion, will be installed equipment, floors, signs, guides and other resources that allow the adequate accessibility of these visitors to the place. In addition, the garden furniture, such as tables and benches, will be made with environmentally friendly materials (reuse of wood, plastic wood) and ergonomically adapted to facilitate ease of use by all visitors. The design of the sidewalks and the floor were elaborated considering the access to all the area of the land and building of safe way, without leaving aside the modern aspect and innovative design giving singularity to the project.

*2.13 Arborization and spaces for various activities*

For the afforestation process, in the external area of the factory will be realized the recovery of the soil, using machines for decompression, aeration and the use of natural fertilization for fertilization. Several local tree species will be used, as well as the installation of lawned areas and beds with ornamental species of shrub and herbaceous character. In this way, we want to create spaces that allow the relaxation and interaction of visitors along with nature. In addition, there will be spaces created for recreation, presentations by local artists, fairs and periodical cultural events. The idea is to harmonize the proposal and concept of the biofactory, uniting the elements of landscaping, and the inclusion of society through activities of training, leisure and culture giving the ecological and sustainable approach bringing innovation and revitalizing the space.

**3. City functionality**

*3. 1 History of Conegliano city*

Conegliano is a city located in the north-east of Italian peninsula at the Prealpi region, the climate of the area is particularly mild because the city is kept from the north side by the Alps and at the south there's the hot Padana valley and the Adriatic Sea. Conegliano is well connected to the most important cities of the north-east of Italy: Venezia, Udine and Belluno.

The city is part of a Treviso province, the area is called "Alta Marca trevigiana". Conegliano was founded around the 10th century, since that age we notice about the Conegliano castle built by the Belluno bishops at the top of a hill. Starting by the 12th century a village grew around the castle and as is common during the middle-age, for keeps the inhabitants and the castle, was built a city wall. On the construction of the city wall and the moat were employed all citizens and people coming from villages around Conegliano.

The urbanization of the Conegliano was characterized by the construction of the castle "Castelvecchio" where were located all the most important buildings (that where all fortified): civil power ("Podesteria") and religious power (collegiate church "Saint Leonard"). All around the castle, artisanal and rural activities were born, the urban architecture and horticulture work of Conegliano citizens was crucial for the creation of the hill landscape he that we can still admire.

During the Scaligeri dominion were done expensive restoration works and wall extension (1330-1334) supervised by the engineer Caronello. Caronello operated also at the final works of Podesta´ palace, he empowered the Castelvecchio with internal walls and with 4 towers.

During the Venetians "Serenissima" dominion (1339-1381), the urban development of Conegliano was characterized by the construction of new buildings at the base of the hill. After the Venetians with the Carraresi (1384-1389) was renovated the Monticano Gate.

On 1420 Venetians conquered the Friuli region; this important event guarantees a long period political stability. Therefore, the walls and fortifications of the Conegliano becoming unnecessary and they were unkept.

The peace period permits the development of the flat area of the city with the constructions of the nowadays Cima square and other important historical buildings: Cima house, Sbarra house, Dome, Academy Theatre, Sarcinelli Palace, Saint Rocco Church, Saint Martino Church. The development of the flat area was also encouraged by the construction of the railways and train station on 1858.

It is important to notice about the civic museum that preserve some important portrait of Giambattista Cima and Pinacoteca. Is it possible to see the lapidarium in which are collected many afresh, tombstones including the "lion chiseled by the French" in the homonymous gate (1797) and the room called "Del Camino or Cucina". Late Renaissance style furnishings are exhibited in the museum.

There are some reproductions of ancient geographical maps and eighteenth-century paintings. On the upper floors the archaeological section and various documents and exhibits of local history. At the top of the museum-tower there is a terrace where is it possible to admire the wonderful Conegliano landscape; on good weather days visitors can see the see and the mountains.

*3. 2 Recovery of the ex-Zanussi area in Conegliano. Our proposal: Biofactory*

Today, the Zanussi Area has become a ruined building, known as a "black hole" or "black eye", due to a huge expansion of the Zanussi factory. This scenario of abandonment is going on since 15 years. Our proposal aims is a requalification of the area with a focus on sustainability, based on three pillars: sustainable and high-quality food production in the city center, green technologies, and socio-cultural environment.

The municipality wants to buy the old Zanussi area, but they are waiting the advisory for estimate the value of the area and the cost of the recovery. The preliminary costs forecast estimate million Euro for the initial restructuring

operations. The Conegliano mayor Fabio Chies, during the research presentation of "Conegliano 2030" commissioned by Confcommercio said: "the most appropriate solution is the acquisition of the area by the municipality".

According to a survey carried out by the Quaeris srl, an Italian company specialized on market research and opinion surveys, in September 30th 2018, where were involved 50 merchants, 507 residents and 250 visitors, the restore of Zanussi area in a sustainable way is considered very important for: 66.9% citizens, 51% merchants and visitors. A large part of the visitors (79.5%), consider very useful the reconversion of the area as a technological museum and in a green area. This project is deemed by the mayor Fabio Chies, an opportunity to have a huge park in the city center.

As well the 68.5% of the residents want a park in the place of the current abandoned area and 38% of the merchants would like to transform the space into a multi-level car parking, since the citizens and merchants indicated the place as the best point to park. They believe that this new building will be an improvement for the city.
Almost the totality of the stakeholders (97.7%), do not want a new residential area in the old Zanussi factory. Part of the money for the acquisition of the area, could be financed by the civil suit promote from the Municipalities of Treviso in compensation of environmental damage of the abandoned factory; other funds could derive from the Italian government "Solidarity Funds".

However, the municipality that had won the first two judgment trials, is waiting the Italian Court of Cassation (that should confirm the previous judgment) to unfreeze the "Solidarity Funds" for the acquisition of the Zanussi Area. For the acquisition is ready almost 4 million of euros, but the final purchase amount is not certain, because is still going on the negotiations with insolvency administrators.

According to the "Confcommercio" President, it's necessary to move into a strategic planning that goes through administrative power, technical and urban competences and management skills, for pass from a call for proposals to the restoration of the area.

Therefore, the Phoenix group (Brazil), projected an excellent restructuring project for the former Zanussi area, one of the members made a trip to the city of Conegliano in December to learn more about the Zanussi area, the city and the population, in order to understand the culture of the city. A questionnaire was carried out to update and complete some information about the Conegliano

Region and the Zanussi area:
1. How long do they live in Conegliano and why?
2.Where do you work?
3. Witch places do they usually attend at night or during the day on free time?
4. Witch entertainments the Conegliano city offers during winter and summer?
5. How the interviewed is related with the old Zanussi factory? Ex.: relatives working there.
6. What does the person expect from the area?
7. How does the person move in the Conegliano city? Ex.: car, bicycle, buses etc.
8. What is the population profile and education level?
9. How is consumption of local products?
10. Witch are the cultural activities?

The city of Conegliano, is a developed city, proud of its long history of Prosecco wine production. From the excellence in Prosecco wine production, they were able (during the last decades) to promote an important tourism economy involving large part of the population. As you can see in a tourist panel, located at the city center, the Zanussi area is still showed as the old Zanussi factory, with modern buildings and open area covered by green lawns.

The reality is quite different from that portrayed, Zanussi factory is in ruins. The whole site is abandoned and buildings are obsolete, most of the windows are broke and the walls are full of graffiti.

The entrance to the Zanussi area, is checked by cameras, because there are some restoring activities on the site. In front of the entrance there are some yellow

painted buildings that at first view looks like in good condition, but in reality, they are as well as the rest of the buildings, in decadent state.

One of the buildings, where it's supposed to be the Zanussi reception, at the external side (street side) is covered by panels with pictures of Conegliano region and grape production. Internal side of the building, shows the real condition of the site with vegetation growing outside windows with broken glass.

The Zanussi open area is located in the west side of the site; this zone shows paved corridor that gives access to the other buildings and a huge area covered by spontaneous vegetation. The paved corridor is used as deposit of obsolete construction materials, regarding the green area it's observed that most of the vegetation was deforested. It is expected that this space could be largely covered by paved soil, but it was observed that most of the site is covered by herbaceous plants and small shrubs, typical of a primary vegetation that appears on an abandoned area.

Every buildings of the former Zanussi factory are in state of decay. Joined with this situation, a garbage truck was observed inside one of the structures. In the northern side of the Zanussi area was noticed organized waste recycling activities. According to our questionnaire, the point of view of a fast food owner, that is located in front the Zanussi area, coincides with the Quaeris survey. The fast food owner said that he has found this restaurant 20 years ago. He would be interested to build a road that give direct access to historical city center of Conegliano, in addition, the Zanussi space could be converted to a parking area. It is noticeable that the black hole, of the 110 thousand square meters of abandoned industrial area (since the 90's), was established next to a beautiful landscape of the Conegliano Castle.

In point of view of the prosecco producer Zinto and his partner, the area must be restored to a thematic green park, adding social and technological value, besides this information, he mentioned that the economy of Conegliano is based on Prosecco production and 30% of the municipality soil are destined to wine production. The Zinto producer inherited the land and all the farm by his grand-

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father, he said that the Conegliano-Valdobbiadene region was characterized by the presence of small family-producers (Figure 7); but during the last decades these farms is going to be sold to the more relevant producers that are creating large estates. Anyways the Prosecco production culture is still transmitted throughout generations, with relevant economical surplus in terms of job opportunity in agriculture and tourism.

The city of Conegliano is developing quickly on tourism, they are able to guest thousands of tourists, coming from all over Europe in hotels, restaurants, the wine shops etc. The "Viale Carducci" is the shopping avenue, where you can find shops with local products; the municipality often organized tourist events and decor the city center according to the happening. Next to the city center there is the Conegliano Castle with the Civic Museum where are conserved many paintings of the Master Giambattista Cima (15th century). Conegliano is famous for the agritourism tour on Prosecco farms. Farmers promote sales by tasting their wines (Figure 8), they are proud to introduce to the tourist how they produce Prosecco and during the hot season they organize walk on the vineyards.
Night-life in Conegliano is quiet; the tourists interested in nature, wine and shops; therefore, young people who wants to clubbing moves Treviso and other bigger cities by car. Citizens prefer to use buses and bicycle to reach the city center because of the traffic restrictions. The young people who want to continue their studies at the university could choose between many important universities such as Venezia, Padova, Bologna and others. It is important to notice the oldest oenology school in Europe, founded on 1876 by G.B. Cerletti e A. Carpenè, that is relevant in keeping the tradition of wine production, but it's also an important scientific research center for vineyard cultivation and wine marketing. The school is associated with: the Padova University, the Regional Center of Viticulture, the Winemaking of Grappa Veneto and the consortium of DOCG.

The Conegliano culinary tradition, handed down for generations is influenced by the Treviso culinary. Most of the traditional dishes have as main ingredient the Treviso bitter red Radicchio: marinated radicchio wrapped in speck ham, timbale with Trevisano Radicchio. In this region dishes based on Polenta spiced with different sauces are very common. Regarding wine production almost totality of the Conegliano vineyard produce Prosecco wine. From the prosecco grapes the winegrowers produce Prosecco-Grappa that is a particularly flowered taste Grappa. The Veneto region is well known for the production of white wine.

In relation to cultural activities, once a year is held the open sky theater representing the history of Conegliano during the Middle Ages period. During the Christmas time, the municipality turns the square Cima into a ice skating rinks. In the same period at avenue Carducci was installed a Giant panoramic wheel and Christmas markets selling tipical products: wooden manufactory, regional foods etc.

Therefore, it is deeply necessary to restore the Zanussi area. The aim is to use this space to create an open area with entertainment spaces, sports and social gatherings. The factory buildings must be demolished and re-built with an area dedicated to shops and restaurants. This project will give a great value to the city of Conegliano and should be sponsored as well by the municipality as by private funds that can have advantage from the valorization of the space. It is important that on this restoration they focused on keeping local culture, creating theaters, gastronomy, training and other types of entertainment, as well as spaces dedicated to urban horticulture and biodiversity instead of Prosecco mono-production.

## 4. Economic feasibility and sustainability

The Zanussi area will be filled with many shop stores, restaurants, a museum and a bio-fabric, besides some recreational areas to serve its surrounding population. The main reason of having stores and a bio-fabric is to ensure the economic feasibility of the project, for they will sell goods and pay a rent-fee in order to return the initial investment of the owners of the complex.

The shop stores will be divided into categories such as: cheese, wine, food, horticultural and souvenirs stores. These places will be rented by local companies and individuals, by doing so keeping the money within the city of Conegliano. The stores will be allowed to sell their goods after applying for a space and will be

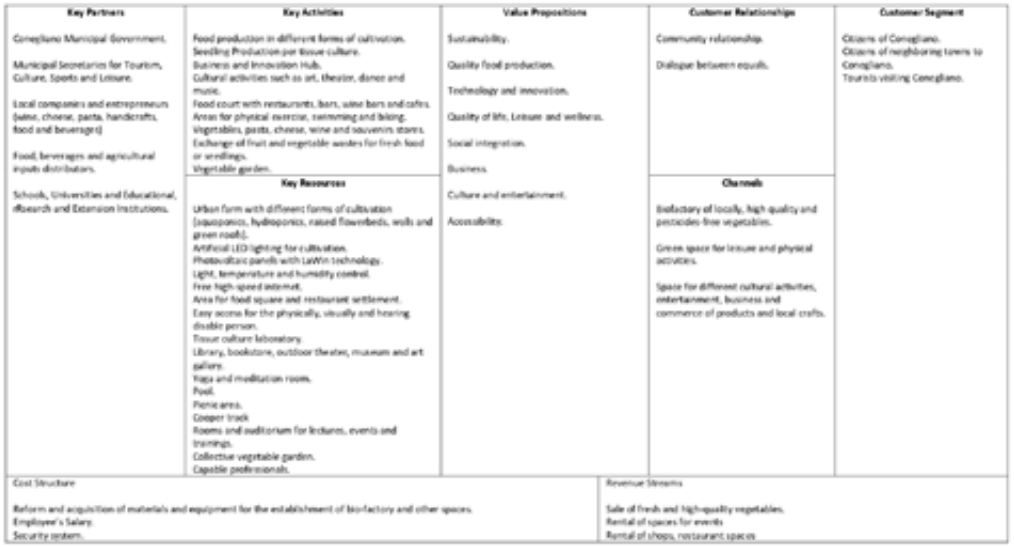
responsible for any necessary change, thus reducing the cost of complex administration. The restaurants will follow the same standards and protocols in order to be able to run in the complex. They will also have to follow the standards proposed by the City of Conegliano.

Regarding the museum, it will charge the visitors a fee as a way to make money and keep working. It will be ruled by the City of Conegliano in a partnership with the La Azienda Zanussi's administration, and it will pay a small fee for the space it will use. The Museum will tell the history of the Prosecco wine, traditionally made within the City boundaries and will bring tourists to try the real and authentic Prosecco Wine. At the end of the visit, visitors will be given the opportunity to buy wine and thus help the museum and local producers.

The bio-fabric will be ruled by the complex administration and the vegetables and fruits produced will be sold in the complex, so citizens, restaurants, supermarkets and companies will be able to buy them within the city. This will reduce the cost of the food, but it will also improve its quality. Because it will not need to travel over hours to arrive in the city, reducing thus the cost of transportation. The horticultural products will be harvested and sold daily, thus providing fresh food daily at a low cost.

The complex will feature some recreational areas for the public such as theaters, cafes, bars, and outdoors gym. They will be ruled by the complex administration or will be given an authorization for some companies to run them at a fee cost. The complex costs will be divided into fixed (water, internet, employees' salaries, maintenance and etc) and variable costs (feedstock, taxes, and etc).

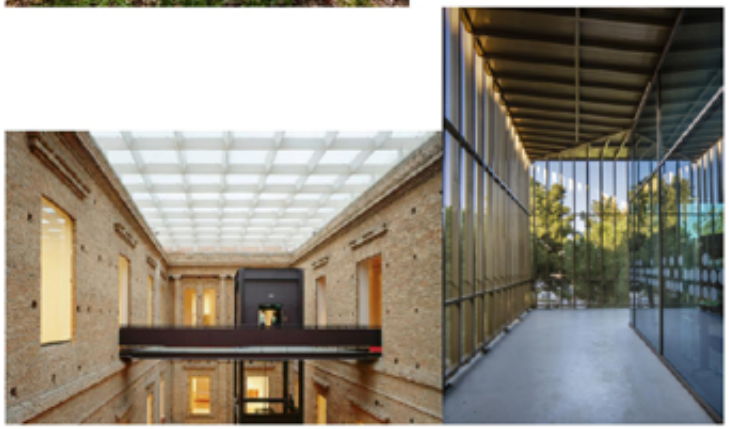
Regarding welfare the complex will distribute organic fertilizer made from the fruit and vegetable wastes provided from the citizens, supermarkets and companies of the city of Conegliano. In addition to this, the complex will provide some lessons for the citizens to learn how to grow their own food helping them to have fresh food at home. This complex will give a new definition to the City of Conegliano helping its economy as well as its citizens.



**Annexes**


Zanussi Area | Conegliano.

urbanistic point of view (imagem via HIC Architectura)

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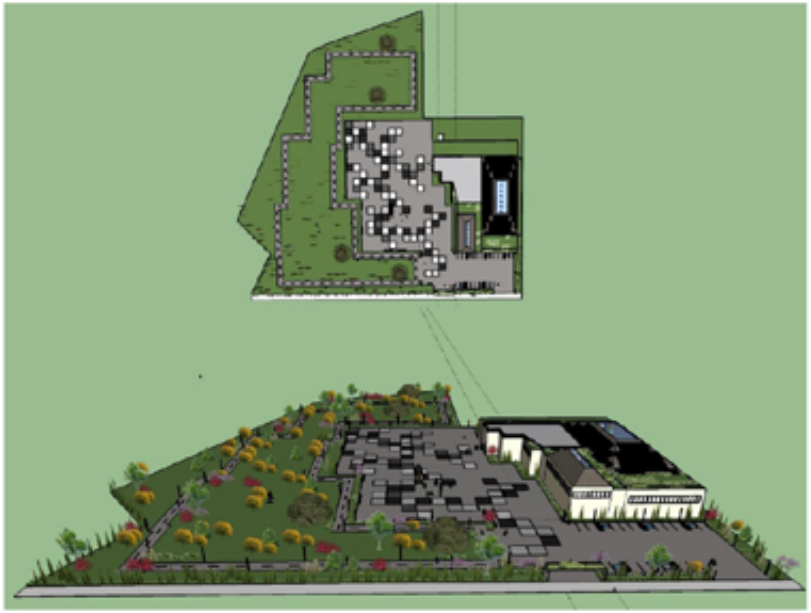

**Figures**

A B

**Figure 1.** Image: Conegliano castle 14th 15th century (A); and Castelvecchhio (B). **Photography:** Citta' di Conegliano *site*.


**Figure 2.** Images: Castle of Conegliano, which currently functions as a museum. Photos: Team Phoenix, 2019.

**Figure**


**Figure 3.** Images: City of Conegliano portrayed in the tourist panel (A) and former Zanussi area (B). Photos: Team Phoenix, 2019.


**Figure 4**. Images: Parking of Zanussi area, in the East direction (A and B); input of the Zanussi area, along with the construction of the Zanussi, in the South direction (C); reception in front of the Zanussi area (D); corridor around the Zanussi area in the west direction (E); and Zanussi outdoor space, in the South direction (F, G, H, I, J, K and L). Photos: Team Phoenix, 2019.

**Figures**


**Figure 5**. Images: Part of the former Zanussi built area (A, B and C); e a garbage truck inside built structures (D). Photos: Team Phoenix, 2019.

**Figure 6**. Image: Part of the parking area of the former Zanussi area and onwards, is the town of Conegliano, also featuring the castle, symbol of one of the main historical sites. Photos: Team Phoenix, 2019.


**Figure 7.** Images: Planting of grapes for the production of prosecco (A); Explanation of the wines produced by the farm, explanation of the economy around the wine production and the questionnaire regarding the city of Conegliano (B); and examples of wines produced and the drink prosecco (C and D). Photo A: Farm Zinto il Prosecco, 2018. Photos B, C and D: Team Phoenix, 2019.


**Figure 8**. Images: Carducci Giosuè street working as a square, an entertainment point during Christmas, with presence of children's toys (Ferris wheel) (A and B), shops for wine, cheese and meat disgusting (C); stores for the sale of Christmas artifacts (D); access to Piazza Giovanni Battista (E); and Piazza Giovanni Battista, entertainment point with skating rink (F). Photos: Team Phoenix, 2019.

# Symbiosis

**with:**

## Zero +

Gaia Pazzagli, Nicoletta Vettori, Elisa Matutino, Elena Pagani, Francesco Uboldi, Davide Tita, Anne Bankeng Maffo

URBANFARM2019

Second Round

# Zero+

Team Symbiosis

# ABSTRACT II





CONEGLIANO - EX ZANUSSI AREA
45° 53' 14" N 12° 17' 49" E

SYM BIO SIS
URBANFARM2019

## 1. TOTAL CONCEPT

Team Symbiosis was born with the aim to retrain a building that is in a complete state of abandonment right now, located in the center of Conegliano Veneto: it is the Ex-Zanussi area, a symbol of 1960s economic growth, but now in a state of complete decadence. We chose to name our project "Zero+".

The lot represents a real "urban chasm", given the considerable surface area inside the city center, but, at the same time, it represents a key point for Conegliano because it is the arrival to the city for those coming from South.

Our team consists of two students with a bachelor's degree in Economy and Marketing of Agro-industrial system, a student with a bachelor's degree in Agricultural Sciences and Technologies, a student with a bachelor's degree in Biochemistry and three students of Architecture, who have joined the UrbanFarm2019 challenge to prove how transversal skills and diversified knowledge of different origins can be brought together in a single, organic, and functional project.

The project involves the design of an innovative urban farm: by using new technologies, we want to create a sustainable, original and aesthetically pleasing space which can guarantee local development from a social, environmental and economic point of view.

In terms of energy, we plan to fight against the waste of water and energy and to reduce air pollution our approach involves the integration of agricultural and architectural concepts in order to create a sustainable, functional and circular living organism. All of this will be possible through the collection of rainwater and its recycling, the use of photovoltaic and solar energy, the installation of smog-eating walls in strategic locations, e.g. in the parking lots, so as to reduce CO2 emissions.

The food chain will also be cyclical: we will produce food in an urban context and make it directly accessible to consumers, so production and consumption have zero mileage.

Adjacent to the production areas, there is a large bistro, with both outdoor and indoor spaces, where dishes prepared with the own products of the urban farm will be served, and the new headquarters of the weekly market of Conegliano, indoors, where also agricultural food and products of the farm will be sold.

All of this will be made without using plastic or other polluting materials.

Here, waste will not only be an output, but also an input, creating a circular economy: this is a primary objective, also given the recent UN research that shows how, within 30 years, about 2.4 billion people will live exclusively in cities; this will involve an enormous consumption of materials and energy to build and expand urban centers.

With currently available natural resources, it is not possible to guarantee the availability of food to such a large number of people.

The urban farm is therefore an effective long-term solution, even in Italy: future cities will not only consume less, but will themselves become a productive and self-sufficient body; in our case, the complex has an area of 4561 square meters for production activities, about a third of the entire built area (about 12 800 sm).

The food production that will take place within the complex will consist of fresh products for immediate consumption, grown according to innovative agronomic techniques, but also primary processed goods such as berries jams and tomato preserves.

Thanks to the knowledge acquired in agronomic terms, a special greenhouse will be set up exclusively dedicated to the cultivation of microgreens, a latest-generation cultivation technique that makes it possible to obtain some varieties of vegetables with high vitamin values.

Starting from the production areas, the pulsating engine of the complex, we want to create a multifunctional center, from whose arteries are departing and depending all the spaces used for social, gastronomic and educational activities. This connection will be organized through an intelligent system of localization of spaces, to ensure spatial continuity within our urban farm.

In order to fight misinformation in terms of ecological footprint and educate the population about agriculture, sustainability, recycling additional spaces are provided for research, study and development of new techniques, which can also be accessed by school groups and universities.

We want to increase the population's knowledge, to promote a healthy lifestyle and to ensure a greener future for the city.

In this way, the whole spectrum of research and dissemination related to sustainable food, thus creating a stimulating and interesting environment, which will help understand and know the world of agriculture and everything related to this scientific field. The population can also take advantage of recreational environments, laboratories in which it will be possible for them to realize their own garden and be followed up, helped to cultivate it in the best possible way; students will be given the opportunity to have learning spaces, a library, a computer area.

The teaching rooms cover a total area of about 900 square meters. All within a new and alternative structure, which integrates local industrial archaeology reusable, historical testimony of the memory of the place, and innovative technologies, necessary for the development and production in the city.

Trying to limit demolition, we are upgrading the Ex-Zanussi complex while maintaining a high level of part of the pre-existing structures and adding some volumes: light transparent greenhouses facing South and West, optimal positions to capture the greatest number of sun rays throughout the arc of the day.

# ABSTRACT II





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a reduced waste of the materials used, the substrate will be reused as a soil improver for future soil preparations or it will be collected and used or sold as mulch along the row of tree crops.
The nutrients will be fed to the plants grown above ground by drip irrigation. The fertilizers purchased, supplied in concentrated solutions, will be diluted in special mixing tanks and the inject into the irrigation pipes.
Ions will be present in the nutrient solution in the following measure:

- 7-10 mmol/l nitrate(NO3–)
- 1-1,5 mmol/l di dihydrogen phosphate (H2PO4–)
- 1-1,5 mmol/l of sulphate(SO4=)
- 4-6 mmol/l of potassium (K)
- 3,5-4,5 mmol/l calcium (Ca)
- 1,25-1,5 mmol/l magnesium (Mg)
- 10-20 µmol/l of iron and manganese (Fe and Mn)
- 8 µmol/l zinc (Zn)
- 10-15 µmol/l boron (B)
- 0,75 µmol/l copper (Cu)
- 0,5 µmol/l molybdenum (Mo)

The nutrient solution will be based on these values but will be adapted according to the growth phase of the plants and to the analysis values of the water and the varieties to be cultivate. For example, in substrate cultivation, strawberry plants are sensitive to excessive concentrations of minor elements such as iron, boron and zinc: on the other hand, a lack of these elements may result in a lack of flower development or fruit malformation. The best water for fertigation is the one poor in salts, because it allows more additions giving less problems of salinity. The ideal water, therefore, will be rainwater, which thanks to our collection center will be available for almost the entire duration of the year. The irrigation system will be equipped with micro sprinklers with a low flow rate of 90 liters/h or rather 1.5 liters/min. The volume of water should be about 9 liters/m2 during a day. This is the ideal dose for water savings and a better conditioning effect. Inside the building, in order to avoid the formation of the main adversities of strawberry such as Anthracnose, Bacterial or Brown Rot, the temperature will always be monitored. Some adversities in fact have optimal temperatures between 8°-12° and others between 20°-25° C° depending on the period of infestation. Thanks to aeration and dehumidification systems, humidity and temperature values will be monitored during all the vegetative stages of the plants, in order to guarantee a healthy growth of the plants.

CHOICE OF VARIETY:
The re-flowering varieties will be cultivated, due to the characteristic of distributing the harvest over a longer period of time (from June to November) compared to the unified varieties. Among these, those most suitable as a source of income, quality and versatility are proposed: Annabelle, Anais and Diamond. In order to increase the production during the period of the year in which we are witnessing the greatest consumption of strawberries, we will also plant production lines of Marmolada unifera variety, highly appreciated for its high productivity in above ground systems, but which only bears fruit 2-3 weeks in spring.

STRUCTURE LOCALIZATION:
In the west greenhouse of 1133 sm of surface will be placed the production area. To ensure continuity throughout the year a different variety choice will be applied, which will include: early varieties. In the section indicated by the green rectangle, measuring 1133 m2, the plants will be arranged in an orientation in the North-South direction that will result in oblique rows of about 20° inclined to the structure, but that will be necessary to ensure the same hours of light to all the rows, and to ensure an adequate photoperiod, a determining factor in order to ensure good productivity of the plants. Considering the lines, placed in pyramidal structure, the density of cultivation will be respectively of about 11.5 plant/m2, for a total of about 13,000 plants.

2.2.2. TOMATOES

INTRODUCTION:
Tomato is a herbaceous plant, potentially perennial in relation to soil and climate conditions, but annual in culture. The stem and leaves are pubescent, with hairs that produce typically aromatic secretions; the leaves are composed, alternate, petiolate and irregularly pinnate. The plant has an indeterminate growth that gives it the habitus theoretically perennial, even if in temperate regions the plant acts as an annual. The stimulus to flowering is autonomous, i.e. it is independent of the control of the photoperiod. After a period of vegetative growth (8-12 leaves, or even less depending on particular environmental conditions such as low temperatures), the plant emits the first inflorescence. Subsequently, a new



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inflorescence is emitted every three internodes (leaves). Although apparently monopodial, the development of the tomato is actually sigmoidal; each segment actually ends with an inflorescence and the growth continues from the highest axillary bud. The inflorescence is pushed laterally and the indefinite repetition of this development confers a habitus of indeterminate growth that requires an upright breeding with the support of tutors. The hanging position of the flower, facilitates the path of the pollen, which thus reaches the stigma. As a result of the floral morphology and complete self-compatibility, fertilization in the tomato is mainly due to self-pollination; the cross-fertilization rate is usually very low.

AGRONOMIC REQUIREMENTS:

Preparation of seedlings
It is essential that the seedlings are prepared in a nursery using a substrate that, in addition to being sterile, does not release particles in the solution, and offers a good base for the seedlings. Therefore, the rock wool cubes will be, without closings at the bottom. The seedlings are reared in the nursery until the sixth-seventh true leaf, or in any case until they reach a development that allows the fixtures to be fixed to the support wires. In the winter it warms up the solution, bringing it to a temperature of 14/16 °C, so as to favour the activity of root systems even in periods of low temperatures.
Transplantation It is carried out by placing the cubes along the cultivation channel, above the plastic film, which will then be closed and secured with staples or clothespins, near the collar of the plants. The density is equal to 3 plants per square meter. This system makes it possible to have higher densities compared to the ordinary cultivation method, since the phenomena of competitiveness are less pronounced. The root systems, escaping from the base of the rock wool cube, will develop within the cultivation planes, invading the available surface entirely and orientating itself in the direction of the solution's outflow. For greater convenience in cultivation management, plants will be grown on a stem.

Nutritive solution
Table of nutritive solution to be applied to tomato culture Dosage elements in $m^2$:

| Elements | Dosage in $m^2$ |
|---|---|
| N(NO3)- | 12.50 |
| N(NH4)+ | 0.5 |
| P(H2PO4)- | 1.00 |
| P(HPO4)-- | 0.50 |
| K+ | 6.35 |
| Ca++ | 7.65 |
| Mg++ | 2.00 |
| So4-- | 2,.0 |
| Ph | 5.80 |
| Ec | 2.30 mS.cm-1 |

Source: Data processing by Leoni S. et al.

Use until the 3rd and 4th flower stage for setting up, solutions with low nitrogen content (10-12 meq-1). This will avoid excessive vegetative growth of plants during periods of intense cold. As temperatures rise, it is good to raise the content in N, to gradually reach 15-17 meq-1 at the end of April, early May, when the plants are in the vegetative phase. Since this is a closed-cycle system, which therefore involves the reuse of the waste solution, it is important to pay particular attention to the control of the solution recovered and reinserted into the circulation. Consumption in solution and fertilizers.

Consumption in solution and fertilizers
Tomato table on NFT liquid films - E.T.P calculated,% of solution reintegration and consumption in nutritive solution throughout the cultivation cycle:

| Period | E.T.P mm | Replenishing mm % | Reintegration Mm | Consumption in ml/plant/day | Consumption in l/plant |
|---|---|---|---|---|---|
| 16 january -31 january | 23 | 44 | 10 | 180 | 2.88 |
| 1° february– 28 february | 59 | 47 | 28 | 249 | 6.47 |
| 1° march – 31 march | 80 | 76 | 61 | 547 | 16.97 |
| 1° april – 30 april | 94 | 106 | 100 | 896 | 26.89 |
| 1° may – 30 may | 115 | 105 | 121 | 1085 | 33.64 |
| 1° june – 30 june | 135 | 113 | 153 | 1373 | 41.21 |
| Total | 506 | | 473 | | 128.06 |

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Source: Data processing by Leoni S. et al.

The data further highlights, a significant saving of mineral elements per unit of product obtained, compared to an open cycle system.

Table of fertilizer consumption expressed in g/plant and in g/kg of fruit:

| Period | Fertilizer elements | | | | |
|---|---|---|---|---|---|
| | N | P2O5 | K2O | CaO | MgO |
| 16 january – 31 january | 0.51 | 0.08 | 0.62 | 0.63 | 0.14 |
| 1 °february – 28 february | 1.22 | 0.22 | 1.49 | 1.52 | O.33 |
| 1 °march – 31 °march | 2.98 | 0.65 | 3.63 | 3.71 | 0.81 |
| 1 °april – 30 april | 4.28 | 0.93 | 5.19 | 5.50 | 1.27 |
| 1 °may– 31 may | 4.82 | 1.03 | 5.80 | 6.40 | 1.56 |
| 1 °june– 30 june | 5.90 | 1.26 | 7.11 | 7.84 | 1.91 |
| Total | 19.71 | 4,.7 | 23.84 | 25.60 | 6.02 |
| g/kg of fruit | 3.9 | 0.82 | 4.73 | 5.08 | 1.19 |

Source: Elaboration by Leoni S. et Al

As for the periods with lack of light, High Pressure Sodium Lamps will be implemented, with a power of 400 - 500 W. They will be placed, one every 10 m2, with a consumption per square meter around 50 W.

CHOICE OF VARIETY:

"Cardinale"
The plants are indeterminate, reaching a height of 1.5 m. The first brush is placed at a level higher than 8 - 9 leaves. The fruits on this brush are the largest from 0.7 - 0.8 kg. All other tomatoes weigh from one and a half to two times less. The fruits are ribbed, crimson. The taste is sweet, the seeds in the fruit are few.
High productivity, 7 to 8 kg of tomatoes can be harvested in one square meter.
dignity:
• delicious fruit
• abundant harvest
The seeding should be done in late March or early April. The seedling growth technique is standard. When planting in the soil, the "age" of the seedlings should be between 55 and 70 days. The landing scheme is 0.7x0.3x0,4 m3 - 4 shrubs of this variety will coexist freely over a unit area. Agro-technics are also standard: regular irrigation, garter, removal of stepchildren and fertilizer.

"Honey drop"
It is a representative of cherry tomatoes, they differ in their color. The tall bushes, in height reaches 2m, very powerful, with large leaves. The fruits are small, weigh up to 30g, apparently resembling a drop of water, amber yellow, sweet.
The fruits grow in clusters, on a branch there can be 15 tomatoes. "Honey drop" variety is resistant to downy mildew and black leg.
The advantages are:
• very tasty and quality fruit
• High performance
• resistance to diseases
Deficiencies:
• without bushes, too much vegetative mass grows. The seeds of this variety have a high germination. The shoots grow up must be in the usual way. It is necessary to plant bushes every 45-50 cm. The care of these tomatoes does not differ from the cultivation phases of other undetermined varieties.

"Black Russian"
Another type of black tomatoes. The bush is vigorous, the leaves are large. The escape reaches a height of 1 - 1.5 m. The fruits are large, oval, flattened from above, weighing up to 150 g, dark red with a brown tinge. The taste is rated as excellent. It is resistant to various diseases, persists in unfavourable conditions.
The strengths are:
• Good fruit flavour
• High performance
No shortcomings were found.



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For growing seedlings, a sowing method is used. But you can also buy seedlings. There are no deviations from the standard growth process of seedlings of this variety.
"Black Russian" in particular care is not needed, so cultivating the bushes of this tomato is based on general knowledge.
All these varieties will be grown without the use of substrates, implementing NFT technology.

STRUCTURE LOCALIZATION:
In the 974 sm South-West greenhouse, half of which will be used for the production of tomatoes and the other for raspberries. This decision was chosen because of the same climatic conditions in the greenhouse to be respected.
The plants will be arranged in a North-South orientation, which will involve rows oblique and inclined about 20° to the structure, but that will be necessary to ensure the same hours of light to all rows, and thus ensure an adequate photoperiod, a factor determined by the productivity of the plants.
The cultivation density is 8 plants/m2, for a total of 3896 plants.

## 2.2.3. RASPBERRIES

INTRODUCTION:
The raspberry belongs to the large family of Rosaceae. It is a very multifunctional crop because it can produce fruit, juice, jams, tea leaves and potted plants. Leaves can be used dry or fresh. The leaves of the raspberry bush are high in minerals such as calcium, magnesium, iron, potassium and phosphorus, and packed with essential substances such as vitamin C, E, A and B complex vitamins. In addition, raspberry is a perennial crop, which can be grown year after year reducing the costs of inputs.

AGRONOMIC REQUIREMENTS:
The cultivation system is in pots for all species but there may be small differences for special needs. The pots must have a capacity of 7-8 litres and the distance of the vessels arranged in rows must be 1-2 meters on the row and 2,5-3 meters between rows. These plants produce on shoots, therefore it's necessary to support them to create an espalier. Pruning is very simple and involves cutting all the vegetation at the end of the growing season, in the period of autumn. In the spring it is possible to cut the suckers in order to delay production. The substrate can be ripe compost or a mixture of coconut fibre and perlite with pH between 5.5 and 7. A drip system is used to administer the nutrition solution. Regarding fertigation, we will use the hydroponic system: raspberries need a nutritive solution of 2-4 hl/100 $m^3$ per day. The nutritive solution must have a pH of 5.5 and an inlet conductivity between 1000 and 1400 µS/cm. The conductivity of the peat must be between 900 and 1200 µS/cm. They have same temperature need of tomatoes, around 20-22 °C, for this reason these crops will stay together.

CHOICE OF VARIETY:
There are two types of raspberries, both with their own specific requirements for growing:
1. Summer-fruiting raspberries bear one crop per season, in summertime (often June or July).
2. Ever-bearing raspberries (also called fall-bearing or primocane-fruiting) bear a fall crop and can also produce fruit the following summer.

According to Meesters (1991) the cultivars of summer-fruiting raspberries bear (Rubus idaeus L.) suitable for off-season production are: Glen Clova; Glen Moy; Malling Exploit; Malling Promise.
While we choose for the ever-bearing raspberries bear: Autumn Bliss; Rossana; Himbo top; Heritage
To diversify the production we will grow hp of different color from red and other species:

- Raspberry with yellow fruit (Rubus idaeus L.): Kiwigold and Herbest Gold (fall-bearing)
- Black raspberry (Rubus occidentalis L.): Cumberland and Explorer (fall-bearing)

Japanese Wineberry (Rubus Phoenicolasius Max.)

## 2.2.4. MICROGREENS

INTRODUCTION:
Over the past twenty years, interest in fresh, functional and nutraceutical foods have been on the rise, compelled by the growing interest of society in healthy eating. Consumers are questing for new products that support health and longevity combined with gastronomic delight. Their popularity stems from their vivid colours, delicate textures, unique flavour enhancing properties as garnishes (e.g. in salads, sandwiches, soups entrées, desserts and drinks), but also from their fortified phytonutrient content and potential bioactive value. Supply and demand of microgreens is highly influenced by emerging gastronomic trends, and species selection relies on producers interaction with chefs and on consumer familiarization with their particular sensory attributes

AGRONOMIC REQUIREMENTS:

Microgreens are positioned in containers of dimensions 25x50 cm. They need a substrate with specific characteristics: porosity higher than 85% of the total volume, relationship between macro and micro pores to guarantee good capacity of water retention and a good level of ventilation. Furthermore, the pH must be between 5.5 and 6.5, the electrical conductivity must be less than 500µS/cm and be microbiologically safe. The substrate in 100% natural coconut fiber (coir) guarantees the roots the right pH, a good level of ventilation, resistance to mold and absence of bacteriological risks. They need 12 hours of light per day, a temperature between 20 and 25 ° C and a relative humidity between 55 and 65%. Water requirement is 500ml per day for a large tray.

CHOICE OF VARIETY:

Common amaranth (Amaranthus retroflexus L.), red garnet amaranth (Amaranthus cruentus L.), sea beet (Beta vulgaris L.) borage (Borago officinalis L.), wild chicory (Cichorium intybus L.), watercress (Nastrium officinale L.), wasabi (Eutrema japonicum Miq.), Radish daikon (Raphanus sativus L. var. longipinnatus), radish china rose Raphanus sativus L.), mustard dijon (Brassica juncea L.), kale red (Brassica oleracea L. var. acephala), cabbage red (Brassica oleracea L. var. capitata f. rubra), cabbage green (Brassica oleracea L. var. capitata f. alba), broccoli (Brassica oleracea L. var. italica), spinach (Spinacia oleracea L.), green basil and opal basil (Ocimum basilicum L.), popcorn shoots (Zea mays L.), rocket or arugula (Eruca sativa L.), pea tendrils and golden pea tendrils (Pisum sativum L.), red veined sorrel (Rumex acetosa L.).

LIGHT:

Generally, microgreens require 12 hours of light that is provided by LED lamps with a light spectrum suitable for plant photosynthesis at least 80-100 µmol/m2/s of PPFD (Photosynthetic Photon Flux Density).

| POSSIBLE SPECTRUM DATA | |
|---|---|
| **UV < 400 nm** | 0 % |
| **Blue 400-500 nm** | 12% |
| **Green 500-600 nm** | 19% |
| **Red 600-700 nm** | 61% |
| **Far-Red 700-800 nm** | 8% |
| **PAR 400-700 nm** | 92% |
| **CCT Kelvin** | 2000 |
| **R:FR Ratio** | 5.5 |

At the same time, it would be optimal to be able to customize the quality (emitted colors ratio) and the quantity (light intensity) of the light in the various stages of growth. Indeed there is a company (c-led) that is specialized in the design and production of electronic applications and customized lighting solutions.

PRODUCTION SYSTEM:

One possibility is to grow microgreens in 'containers' constituted by biodegradable trays (polylactic acid – PLA – and others), rather than those made of plastic deriving from oil.
The containers will be placed on 6 growing channels floors in a vertical system, perfectly levelled, and comprehensive of a hydroponic system, through sub-irrigation, for the drainage and recover of the excess water or nutrient solution.

CULTIVATION:

Indicatively, the seeding density can fluctuate from 1 seed/cm$^2$ (for larger seeds, such as, pea, corn, etc.) up to 4 seeds/cm$^2$ (for the smaller seeds, like top of broccoli, cauliflower, chicory) to obtain an average yield around 1500 g/m$^2$. The seeds intended for the production of microgreens will be GMO-free, organic and must be selected to have a germination capacity of more than 95%. Germination must take place in absence of light, with a temperature suitable for the species (15-25 °C) and high relative humidity (80-90%). The cultivation trays must be covered, without touching the seeds, using for example a matt plastic film, with the aim of increasing the temperature and therefore the speed of germination and maintain conditions of high humidity in the germination environment. Once germination has taken place, the cover must be removed. During the germination phase, a spray can be carried out from above, while later on, sub-irrigation systems are preferred, in order to avoid directly wetting of the young shoots, the excesses of humidity and to limit also the onset of phyto-sanitary problems.
The microgreens growing cycle can last from 7 up to 21 days after the germination. Microgreens are ready to be harvested at the appearance of the first true leaves, when the cotyledons are fully expanded and still turgid, and depending on the species have reached a height of 5-10 cm. The harvest can be performed by cutting the seedling few millimetres above the growing media, either manually using a pair of scissors or a blade, avoiding to include particles of the growing media.



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Being highly perishable, microgreens should be washed, packed into a biodegradable packages and cooled (1-5 °C) before supplying to the market or consumers. The storage time is 9-21 days.

## 2.3. PRODUCTION TECHNIQUES

### 2.3.1. HYDROPONIC SYSTEM

The term "hydroponics"; derives from the Greek "hydros" (water) and "ponos" (work); literally: "water that works"; this technique has developed in response to the search for more sustainable cultivation systems, thanks to the use of automation and computer systems for the control of the nutrient solution and for the recovery of water (closed system). This definition therefore refers to cultivation methods in which plants are housed in an inert or liquid substrate, and nutrients (macro and microelements) are supplied in solution.
In the cultivation of raspberry, tomato and microgreens, we will use different substrates made with inert and light materials such as vegetable fibres, rock wool, expanded clay, pumice, perlite that act as a support, and water, according to the irrigation system chosen (subirrigation or drip), brings nutrients. Compared to traditional cultivation, guarantees a water saving of 70% less, and also the fact that it is a closed system recovers up to 30% of the solution in each cycle.

### 2.3.2. VERTICAL FARMING

It is a method of increasing production per m$^2$ in which trays, gutters or pallets can be arranged on several levels, one on top of the other, in a "multi-layer"; cultivation systems by means of a multi-storey support system. It is advisable to make use most of the sunlight coming from outside, but natural lighting is not sufficient for the growth of plants inside the greenhouse, and it is necessary to increase it with low consumption LED lamps. The energy needed to power the artificial lighting is obtained through the use of systems for converting vegetable waste obtained in the harvest, or with renewable energy systems and zero environmental impact (such as photovoltaic panels placed at the top of the structure). Microgreens and aromatic plants grown outdoors use this system.

### 2.3.3. AERO-AQUAPONIC SYSTEM

At the centre of the exhibition area will be located some aquariums where fishes will reside. High columns emerge from the aquarium on which ornamental, medicinal and aromatic plants will be placed through various supports. Below the aquarium we will find another tank where a pumping system will take water from the aquarium and, passing through a filtration system, will bring water to the nebulizer, located inside the column.
The latter will be used for irrigation that will take place directly on the roots because they have no substrate for which they remain suspended in an oxygenated environment. The water coming from the aquarium, is rich in nutrients, resulting in an excellent natural fertilizer, also percolating falls on a plane where, through a channel, is recovered by returning it to the aquarium. We have therefore adopted two types of systems: the aquaponic system to ensure that water is rich in nutrients without the addition of chemicals and the aeroponic system so that the cultivations of the chosen plants take place vertically without the need for substrate and having greater oxygenation by preventing the radical.
The advantages of this system, are linked to the considerable saving of water compared to traditional crops, also water being rich in natural fertilizers allows a growth of 30-50% faster than crops cultivated on land. The economic and environmental advantage that has convinced us to adopt certain techniques lies in the self-production of fertilizers and fertilizers that are not harmful to the environment and health.

# 3. CITY / DISTRICT FUNCTIONALITY

## 3.1 ROLES AND INTERACTIONS OF CITIZENS WITH THE STRUCTURE

### 3.1.1. A DEMOCRATIC MODEL

One decisive aspect to make our project work is certainly the active participation of citizens.
In fact, they should all feel welcome to participate to the activities and the initiatives of the structure regardless of their social background, ethnic group, origins or age. We want to enhance this feeling of inclusion by creating a multicultural center outside and inside, from the layout of the new urban park to the organization of the activities and exhibitions inside. Furthermore, they should all feel indispensable for the survival of the structure: by renting spaces, participating to the activities and also taking care of their own piece of greenhouse or garden we want to make them feel at home. They are not only anonymous buyers of products with an unknown past: here, they have an active role by watching their own food being planted, grow, being harvested and transformed, and they can be part of this project in every moment.
Some people can also consider the urban farm as a real, full-time work: the rebirth of this structure will create new jobs and new professional figures will be needed.

In addition, it will help renovate a district of the city that is now considered as degraded and disconnected. We know well that this is a difficult and delicate operation, but inclusion and democracy are the key elements to mend this kind of wounds in the society.
The main strategy of this project is that citizens are not only consumers of products and services, but that they are also able to take part in the implementation of activities of social interest that will be organized within the structure.

### 3.1.2. URBAN CONTEXT AND FACILITIES

Our project is functionally inserted in the city centre: the realization of one is linked to the relaunch of the other, they develop and interact synergistically.
The redevelopment of our building will involve the context and an improvement and strengthening of the road links.
On the North side of the project area we can find the city's railway station: located in a central position, this is an important element of strength, having direct access to the city centre, being the point of entry for tourists and the point of departure and arrival for commuters and users at provincial and regional scale.
As the train station is fundamental for the arrival at our Urban Farm, we want to allow the exchange of bike-train and then create a bike path that connects them directly, so as to facilitate the use of the area and accessibility to the urban farm.
On the north-west, however, we find the area called "Biscione", a name that derives from the presence of an architectural complex with an elongated shape.
It is the home of the weekly market that has been held for years on Fridays, which has become a tradition in Conegliano's culture, but suffers from a bad commercial reputation, so we are planning to host once a week the agricultural sellers of that market inside our Urban Farm.
Although centrally located, the Biscione suffers from a "physical" detachment from the urban core represented by the railway line. In addition, there is no complete connection to the project area and the station, so it is once again necessary to create a directional continuum between station-Biscione-Zanussi.
It is therefore essential to overcome the fragmentation of the urban fabric created by the railway axis and the lack of suitable road infrastructure, through the creation of a direct connection between the three city poles, if we want as many people as possible to visit our structure.
We will encourage the local population to move in a "sustainable" way, i.e. by taking advantage of pedestrian paths and soft mobility.
Once arrived, the visitor can leave his bicycle in the special depot inside the area; for users who arrive by car, it will be possible to park them in one of the two redeveloped car parks, one in Via del Ruio and one in Via Innocente Pittoni, respectively to the north and east of the plexus.
The first consists of 170 parking spaces, the second of 290 for a total of 11676 square meters of parking space. In addition, if necessary, the parking spaces will be equipped with shelters on which to install solar panels to contribute to the energy supply of greenhouses and other environments for public and social use.
Within the lot, in the Western part of the complex, there is a vast plot of land of about 75000 square meters to be reclaimed: the project provides the construction of a large park with various pedestrian paths that can host outdoor events, areas dedicated to recreation and the creation of social and therapeutic gardens.
The park can also be accessed by those not interested in visiting the entire complex: they can enter through the two entrances located one to the South and one to the West.
Our park is animal friendly in order to help people meet and create new relationships through their pets.
Through these interventions, our structure will become a sort of dynamic and alternative "hub": a vital and pulsating centre from which it is possible, through the creation and enhancement of arteries, to reach all the functions of Conegliano.

### 3.1.3. A BOTANIC GARDEN FOR EVERYONE

The enormous space outside the greenhouse can be used in part for the creation of a botanical garden consisting of edible gardens and other exclusively exhibition. The gardens will not be built directly on the soil, as it is possible that it contains pollutants, such as heavy metals, because of the use that has been made of it before. However, a total clean-up of the soil would be necessary even if it is known that phytotechnologies are less expensive and at the same time effective. The gardens, therefore, will be systems without soil (soil-less system on peat) raised by masonry, wooden chests and vertical walls so that the plants are not in direct contact with the ground. The entrance to the garden will consist of two vertical walls that house some aromatic species of the Lamiaceae family, including Rosmarinus officinalis, Calamintha nepeta, Thymus vulgaris and Salvia officinalis which are all perennial species.

Once inside, next to the promenade, there will be numerous wooden chests of different sizes, which can be rented to people who want to grow their own vegetables. This activity will also be proposed to communities, nursing homes and all associations that would use it for both therapeutic and integration purposes. Manuals and the work of the land are tools for sharing and therapeutic factors, a way of education and growth. When the work is shared and aimed at a common production of recognized value, it helps to restore awareness, security and stability to people. Finally, for the students, there will be the possibility to run their own garden free of charge, provided there is constancy, with the aim of bringing young people closer to nature and its conservation. The entire garden will have to be managed biologically without the use of chemicals in order to comply with the principle of sustainability.

Furthermore, we will find a series of plant species such as (Zea mays, Cannabis sativa Helianthus annuus) intended for phytoremediation, a mechanism for the absorption and transformation of organic xenobiotic chemicals (chlorinated solvents, petroleum-derived compounds, pesticides and explosives), as well as mechanisms for the extraction and accumulation of inorganic contaminants such as heavy metals.
In addition, the above-ground cultivation of the Glera grape variety, which is the main cultivation for the Conegliano-Valdobbiadene area, will be planned. At the moment, however, we are facing an intensification of the crop, through an immoderate use of pestilites and pesticides, which are ruining the landscapes but above all intoxicating the citizens. For this reason, we will face educational courses on organic and biodynamic agriculture on the vine, in order to enhance sustainability while respecting the environment and trying to put the right interconnection between land, plant and man.
Finally, a bio-pool will be set up to house aquatic plants and fish that can purify water, which will then be used inside the greenhouse, without using chemicals.

## 3.2. SPATIAL AND FUNCTIONAL INTEGRATION

### 3.2.1. FUNCTION AND DISTRIBUTION OF COMMUNITY SPACES

One of the decisive factors for the success of the project and thus the proper performance of the greenhouse and of the gallery of exhibitions is the degree of satisfaction and inclusiveness that the spaces and activities guarantee to those who are supposed to use them the most: the citizens.
Essentially, it is possible to associate the two buildings with different types of inflow, as they are intended for different functions.
The Northern building is basically divided into two areas: on the one hand we will find the exhibition gallery, where you can access by buying a ticket at the info point at the entrance, on the other hand, a public area of free access where we will find a library with computer area, a co-working area and a conference room bookable.
The Southern building, on the other hand, is mainly used for production purposes. Inside you will find greenhouses powered by natural or artificial light (LED). In addition to the production activity, the main aim is to teach the population the right way to cultivate and educate them to a healthy lifestyle. For this reason, it will be possible on fixed days of the week to book a visit inside the vertical greenhouses. In addition, inside the laboratory located in one of the greenhouses facing the large botanical park, there will be an area where we can host cooking classes or experimental activities. In the central area of the building we will design a large space where you can have a weekly indoor market, where you can can also buy products made from greenhouses. In the greenhouse overlooking the botanical gardens on one side and the exhibition gallery on the other, there is a bistro, with both outdoor and indoor spaces, where our healthy dishes will be served.
We can also guarantee access to the various parts of the complex for physically disabled people thanks to the development of the ground floor of the structure and the absence of architectural barriers.

#### 3.2.1.1. SPACES FOR INTERACTION

- Market (1452 sm): this space, located in the heart of the productive zone, is a common area in which people can meet and buy all of the products produced in this innovative farm, either fresh or processed. Meanwhile, they can also take a look at the different productive systems located around them, because of the transparency of the walls made of glass.
  Our aim is to make this space the new home of the weekly market of Conegliano, in which producers and farmers from the neighbouring areas can sell their products. This will bring people together and will also make the ex-Zanussi area a new place of meeting for the city of Conegliano.
  We will work hard to ban the use of plastic in packaging the market's products, using natural, alternative and recycled materials.

- Exhibition gallery (1555 sm): Taking advantage of the pre-existing extended space with vaulted ceiling, we created a double floor gallery in which we can host temporary exhibitions, shows and fairs. Our aim is to create a dynamic cultural center where people can learn and experience something new every few months, going from artistic and aesthetic interests (photographic exhibitions, pictorial installations) to exhibitions of the agricultural sector (wine tasting, demonstration of new agricultural technologies...). We implemented the available space to display all these goods by inserting a metal structure that acts as a balustrade and allows visitors to look out over the central part of the gallery, where we are placing a prototype of an aquaponic system.

- Bistro (555 sm): here people can have a try of the products made in the tower and prepared by chefs. This space is made as a greenhouse so it's completely glazed and it's furnished with plants hanging from the ceiling to create some shadow and with natural materials such as wood. Furthermore, all the products will be sold and served without using plastic (for example, we will not sell plastic bottles of water) or polluting materials.


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3.2.1.2. EDUCATIONAL SPACES

- Library and computer area (143 sm): In this area, students and citizens will find a place to study and concentrate together with the chance of using collective computers and Wi-Fi network for free. In addition, they can have access to a fair amount of books and magazines.
- Conference and screening rooms (172 sm): whether a company, a school or a private needs a place to meet, we give them the chance to rent these rooms where we are placing multimedia equipment and tables for group work.
- Expositive greenhouse: within an area of the park we are placing an expositive greenhouse that people can rent and take care of their own part. Outside, we are creating a relax area with tables and seats where people can rest and enjoy the natural space that surrounds them.

3.2.1.3. WORKSHOP AND COURSES (laboratory, area coworking)

- Workshop greenhouse (514 sm): adjacent to the bistro, this greenhouse is hosting some crops made using innovative techniques. In this way, here we are organizing laboratories, workshops and courses for students and citizens to help children and adults learn something new about our productions and philosophy.
  A part of the greenhouse will be dedicated to the management of the bistro in order to grow their own vegetables that will then be used by them in the service. This will allow customers to see the path of products from cultivation to the table, while ensuring the freshness of these products. Before being rented to the bistro, the greenhouse will already be equipped with hydroponic and airborne systems. Crops will be especially vegetables easy to manage so as not to need constant agronomic advice.
- Coworking area (74 sm): here we are creating the chance of social interaction by renting these spaces to groups of people who need a place to work together on their projects, for example start-ups. They can reserve these rooms for some hours or for days, depending on their needs.

3.2.1.4. CHILDREN AREA

- Children area: a closed area of the park will be completely dedicated to children: we are placing here games and interactive spaces where they can play and do activities safely outside in the nature.

3.2.2. COLLABORATIONS AND LEASING SPACES

Many of the spaces can be rented out to external, community or private contracts.
It will be possible, as far as the bistro is concerned, to obtain the management at the sum of € 2,500/monthly fee.
We can entrust to the citizens over 65 interested, land-based gardens to be grown on their own, in outdoor greenhouses. For citizens under 65 it will be possible to rent a plot of land inside the outdoor greenhouses to grow it for their own livelihood.
Cost: euro 30/monthly fee.

- Group 1 : Universities
  It will be possible for universities, such as the University of Agriculture or the Faculty of Viticultural and Oenological Sciences and Technologies in Conegliano, to rent the laboratory, the educational gardens, the weekly market area, the conference room, as well as the library and the coworking room, to carry out research on new technologies for cultivation. We will also provide students with some greenhouses located outside for educational purposes.
- Group 2 : Sellers
  For private citizens or, more particularly, for sellers, it will be possible to rent at the weekly market specific counters for their sale within the market area. Within the market we will welcome wine and food producers and sellers, especially by favouring sustainable and locally sourced products.
  During the summer period, the weekly market can be set up, as an alternative, in the outdoor park.
- Group 3 : Start-ups
  It will be possible for new temporary organizations or corporations in search of organizational and strategic solutions, rent the coworking room as well as the conference room that can be divided into several rooms through mobile furniture. In case of high demand, it will also be possible to create temporary partitions in the library area in order to create more private work spaces. For each customer will be possible to use the wardrobe equipped with safes.
  - 3.1. Shared spaces
    These are shared spaces, upon availability, including a desk and WIFI access. Cost: - euro 50/monthly fee.
  - 3.2. Private spaces
    This is a private space, subject to availability, including a desk, lockers, WIFI access and projector.
    Cost:



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- 4 people seats: euro 120/monthly fee;
- 6 people seats: euro 160/monthly fee;
- 8 people seats: euro 200/monthly fee.

3.3. SUSTAINABILITY: ENERGETIC STRATEGIES

3.3.1. REUSE ARCHITECTURE AND DESIGN

As already mentioned, our project therefore foresees the lowest possible number of demolitions: in order to reduce the costs of labor, materials and transport, and to keep the history of the Zanussi Foundry symbolically alive.
We will make the most of the existing environments and organize the re-functionalization of the buildings.
The materials resulting from the demolition can be used as furnishing elements inside the structure and in the park, such as flower pots, bench seats, decorations, or even low-cost insulating walls: we will create eco-design elements, a concept based on the complete recycling of building materials that would otherwise remain unused.
In this way, a real "circular" building is created, in which the shipbuilding materials, at the end of their life-cycle, are completely recovered, transformed and, in our case, reused on site.
In this way, we are subverting one of the most energy-consumptive and polluting fields, such as classical construction industry.

3.3.2. WASTE RECYCLING

Organic waste coming from production, catering and consumers should be collected in order to obtain compost that can be reused for production. If the citizen, however, will hand over their organic refusal to the facility, they could be rewarded with one of our products or services. Also, once we get to the required amount of compost, the surplus will be sold. Organic waste is incredibly rich in methane, so it is the ideal ingredient in the process of creating biogas and recovering useful energy: in fact, through an anaerobic process, the waste releases methane gas. In other words, potential energy is stored in the organic waste.

3.3.3. INSULATION

The building will have good thermal and acoustic insulation, thanks to the combination of suitable insulating panels in the package of vertical partitions and, on two external facades, green ventilated walls.
The ventilated facade allows the natural circulation of air in the space of the cavity, due to the convective motion produced by the presence of openings at the base and top of the facade. The movement of the air in the cavity helps to dry out any water infiltration and to remove the heat accumulated by solar radiation, thus also improving the thermo-insulating properties of the wall.
As far as the insulation layer inside the vertical masonry package is concerned, we have chosen the expanded polystyrene synthesized EPS with delayed flame propagation enriched with graphite, which has a high thermal insulation power; these are specific panels characterised by the combination of standard EPS and graphite EPS.
The thickness of the insulation panel will be 120 mm so as to achieve a thermal resistance of 3.85 ($m^2K$)/W and a thermal transmittance of 0.26 W/($m^2K$).
It would be interesting to build low-cost insulating walls with building materials derived from the demolition of existing volumes.

3.3.4. NATURAL AND ARTIFICIAL VENTILATION

By guaranteeing a correct exchange of air it will be possible not only to make the rooms healthier, but also to guarantee the right level of temperature and humidity in order to guarantee the correct thermal comfort for the production and for the habitability of the places.
As far as natural ventilation is concerned, the "stack effect" should also be mentioned; buildings behave as if they were a "chimney": inside the structure, in fact, there is a movement of air that brings the wind from the bottom to the top because of the difference in pressure.
In addition to making the most of the principles of natural ventilation through special openings, we include a mechanical ventilation system with energy recovery consisting of several air ducts that allow the replacement in the rooms and the recovery of energy produced to heat other rooms.
This system is excellent in terms of energy performance as it is estimated that it will be able to recover up to 95% of the energy produced.

3.4. SUPPLIES AND MANAGEMENT SYSTEMS

3.4.1. REUSE OF WATER

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From the water point of view, in the implementation of our project we have the objective of minimizing the consumption of public water, or rather water from the municipal aqueduct. An analysis of the precipitation assured by station "Arpa Veneto" located in Conegliano, shows that in the last 3 years 3,479.4 mm of rainwater have fallen, respectively 1,333.0 mm in 2016, 1,048.6 mm in 2017 and 1,097.8 mm in 2018, for a total of 283 rainy days out of 1,095 days.
Thanks to this data and knowing the measurements of the building used for the recovery of rainwater for our productions, the goal is to recover as efficiently as possible large quantities of water, introducing it into special tanks and having it available at all times to try to supply almost completely the water needs of production.
Based on precipitation data and the measurements of the buildings involved in the recovery of rain water, it is possible to calculate, taking as an average of annual precipitation 1,159.8 mm, how many liters will be collected in one year:

Surface area of roofs = 10.247 $m^2$
Average mm fallen in 3 years = 1.159,8 mm
Average m fallen in 3 years = 1,159 m

Volume of water falling on the surface

1,159m x 10.247$m^2$ = 11.876,3 $m^3$

because 1m3 of water corresponds to 1.000 liters

Liters of water collected for year: 11.876.300 liters

Water collection scheme (figure) reservoirs

The water will be collected by a system of gutters represented by the blue lines, the water will then be distributed through pipes to the spaces used for pumping and mixing.
The excess water recovered during particularly rainy seasons, will be stored in special tanks buried in the areas surrounding the structure, this will allow the water to maintain a temperature higher than 0 °C in winter and to be fresh during summer.

### 3.4.2 GREENHOUSE MICROCLIMATE CONTROL

The objective set for the greenhouse management is to develop an automatic system, through the use of new technologies and wireless solutions, for:
1. optimal control of irrigation of plants cultivated in the greenhouse, starting from measurements of soil moisture and the main micrometeorological parameters;
2. control of the greenhouses microclimate by managing the existing environmental conditioning systems: opening / closing of doors, fan heater, ventilation system, misting system, shading sheets, lighting, etc.
The wireless technology improves the monitoring and management of the main environmental and crop parameters of the greenhouse, reducing at the same time the problems related to the presence of the connection cables and solving problems of representativeness of the measurement points. For the heating system, we will use the biodigester of the Waste Transformer to produce a percentage of the energy required to warm up the climate during the colder season and for cool down during the warmer seasons in all the plant production sections.

#### TEMPERATURES

The temperature acts on the vital functions of the plants and is generally critical below 0 °C or above 70°C.
For example, the temperatures for tomatoes are:

- Optimum temperature: 20-24 °C
- Heating underneath: 7 °C

#### HUMIDITY

The humidity of the indoor air of a greenhouse is fundamental for the life of plants. It intervenes in the growth, transpiration, fertilization of flowers and development of diseases, when it is excessive. For example, the right humidity for tomatoes is 50-60% and for strawberries is 70-80%.



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If the humidity is too high, it makes evaporation more difficult. If it is poor, it increases perspiration until it hinders photosynthesis. Humidity, with the same amount of water in the environment, changes with the temperature, so you must check both parameters to get the best conditions. Excessive humidity is corrected by ventilation, raising the temperature and avoiding damp soils. On the contrary, it can be increased, if it is scarce, by irrigation, pulverization of water or present surfaces of water.

#### COOLING

The graph in Fig.1 shows the temperature difference between the inside and outside temperature of a closed greenhouse, without openings, during the daytime hours.

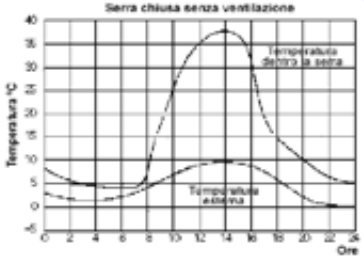


Fig. 2: Variation in temperatures throughout the day

The use of mechanical cooling based on compressors, heat pumps, etc., is absurd, due to the very high cost. That's why we're going to use cheaper systems like ventilation.

#### VENTILATION

Ventilation in a greenhouse consists in replacing the hot air inside it with another mass of cooler air coming from the outside. In this way, much of the heat overload can be evacuated by reducing the temperature and, at the same time, changing the humidity and gas concentration.
There are two ventilation systems that can be used: Natural Ventilation and Mechanical Ventilation. The ventilation system must be chosen according to the type of cultivation and the characteristics of the building. The description that will be made of both systems obeys the experimental constructions carried out, rather than theoretical calculations, but undoubtedly you can indicate as a common goal the fact of establishing hourly changes between 45 and 60. The indoor temperature on a sunny day will be 5. 5 to 6. 5ºC above the outdoor temperature with 45 parts per hour and 4. 5 to 5. 5ºC with 60 parts per hour.
The air inlets are designed so that in winter the outside air mixes with the inside air of the room before affecting the plants.

#### Simple mechanical ventilation

Mechanical ventilation consists of renewing the air with the installation of electromechanical fans located on the roof or in the upper part of a side of the hall, depending on the width of the same. The external air inlets are located in the lower part of the wall opposite that of the fans or on both if the exhaust is central, Fig. 2.

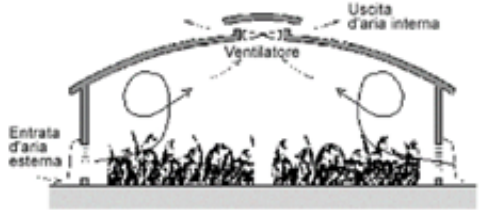


Fig. 3: Simple Mechanical Ventilation (Large Sheds)

It is called "simple" because the conveyance of air from the outside, with its temperature and humidity discharge, after being passed from the inside, evacuating humidity, gas and heat load to the outside. It is logical that the minimum internal temperature that can be expected with this system is at most the same as the outside air. The number of air changes, between 40 and 60, will indicate the necessary air flow.

Q ($m^3/h$) = room volume x N
And the number of fans will be:
N = total Q/q (flow of a fan)
The fans will be distributed along the hall, or on one side, separated by 7 to 10 m from each other. For the side fans, gravity dampers will be placed to prevent reverse currents when the fans are stopped.
The air inlets will be protected towards the outside with grills to prevent the entry of birds or rodents. Inward deflectors will be placed if the outside air directly affects the closest systems.
The electrical connection of the fans will be made by means of speed regulators that will allow to obtain different ventilation regimes according to the needs.
Another important factor is the integration of the plant production and the other sections of the building. Currently there are very few greenhouses in the world that are connected with the non-productive sections of the building in terms of energy, water resources and gases such as CO2 and O2. One example is ICTA-RTG: compared to conventional greenhouses, recent evaluations of ICTA-RTG have shown interesting peculiarities in terms of greenhouse climate performance.
In this way, we will use pipes and conducts to transfer warm air from the greenhouse section to the other section. When the temperature is too high for the plant production and, vice versa, when the temperature in the non-productive sections of the building is too high, we can carry out a heat transfer directly to the greenhouse. We want to promote a climate management of the greenhouse using the minimal energy requirements. For this, we want to use the control of the greenhouses climate using minimal energy and grower defined bounds, for temperature, humidity and CO2 concentration.
The greenhouse section of the Green-Tower will be equipped with: LED lamps (12-30 $W/m^2$) with an efficiency of conversion electricity into PAR of 50-55%, a pipe rail heating system (1.1 m of $pipe/m^2$) and, for each 80 m2 greenhouse - area, one air to-water heat exchanger (OPAC-106) is provided and can be used to heat, cool, and dehumidify the Greenhouses air. The bound of the system will be based on the current status and the needs of the specific crop. Some of the factors that can influence model performance, include the accuracy and consistency of the measured data and incidental spatial differences due to factors such as unrecorded operational activities and/or unrecorded intervention by people.
In order to make the system work, the climate parameters must be controlled within the confined environment. Those are: the temperature and relative humidity of the air, the temperature of the soil or of the growing substrate, the level of radiation to which the plants are exposed. Optimum microclimatic conditions within a greenhouse ensures the suitable environment for plant growth, energy saving and a save setting for workers. An integrated management of the controlled environment ensures a gradual optimization of the use of resources (water, nutrient solution, thermoregulation, etc.) within the production-structure. The proposed system aims to reduce the consumption of water, nutrients and energy, safeguarding and regulating the daily distribution according to the real needs of the plant and the characteristics of the production system. This can happen thanks to different sensors that measure all the parameters necessary for a good production. Useful sensors to optimize fertigation are: brightness sensor; anemometer; rain; camera module; air temperature sensor (indoor outdoor); air humidity sensor (indoor outdoor); electric conductivity sensor (EC); soil moisture sensor; shading and thermal screens; darkening. In order to decrease the incoming radiation and/or the internal temperature a shading / reflective sheeting system is being used, which is placed within the greenhouse about one meter from the walls and from the ceiling in order to create an inner tube. When the internal temperature rises excessively due to high external radiation level, the reflecting cover returns a part of the radiation to the outside. In this way, the warmer air, remaining in the space formed between the sheet and the walls, can be easily sucked in by the ventilation system. Alternatively, the shading sheets can be applied on superstructures placed on them greenhouse coverings to protect crops from unwanted radiation. The development of plants is greatly influenced by light in terms of quantity, quality and durability. In some types of greenhouses there are lighting systems auxiliaries with the task of carrying out a dual function:
1) increase the intensity of the radiation inside the PAR (Photosynthetically Active Radiance) in presence of overcast or low sun on the horizon (to favor the photosynthesis);
2) lengthen the duration of the day to change the photoperiod.

### 3.4.3. PRODUCT STORAGE AND SALE

To store the products for both temporary and prolonged periods of time, it is recommended to use food containers; also for temporary racking and stoppages of raw, secondary or semi-finished materials. For this reason we have provided inside the productive zone an area used for cold rooms, which can accommodate part of the production (microgreens, berries), in order to preserve the physical and chemical characteristics of these crops.
Moreover, when production has reached full capacity, it has already been decided to expand the structure with another building, able to accommodate and preserve in the best possible way the full production.
During the storage of the goods, in the event of heat treatments or the addition of additives to guarantee the best preservation of the product. These operations will be carried out in compliance with European directives, and an operator will keep under control:
- Thermal control and recording
- Registration of purchased additives and their use



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- Monitoring of the hygienic conditions of the premises and equipment used
We'll need three kinds of storage:
- Dry storage
Recommended for canned goods, grains, cereals, seed, hard squash, root vegetables, and dried vegetables, herbs and fruits. Not recommended for longer term storage.
Temperature: 10°C / 15°C
Relative humidity: 15% or less
- Refrigerated storage areas (especially for Microgreens and berries)
Temperature: 2°C/4°C
Relative humidity: 15% or less
It is recommended that soft produce and other delicate vegetables such as lettuce should be harvested as needed and stored for as little time as possible;
- Frozen storage areas
Temperature: -18°C or lower to maintain the quality
Relative humidity: 15% or less

## 4. ECONOMIC FEASIBILITY AND SUSTAINABILITY

### 4.1. ECONOMIC ASPECT

#### 4.1.1. GENERAL BENEFITS CREATED

Our proposal for the urban farm in Conegliano provides a wide range of social, environmental and economic benefits. By an attractive offer of activities we create a public point of encounter, which through a democratic concept and inclusion of the citizens creates a high level of common content and participation.
This model of a socially integrated multifunctional center combined with new architectonic and agricultural techniques allows the renovation of a building, which has the potential to become an emblem, but also a point of tourist interest. The new technologies make the ex Zanussi Area a model of agri-food center that can become a model to follow.
The possibility of cultivating, collecting and buying the products proposed in chapter 2.4 is certainly beneficial for the citizens. Furthermore, the role that Urban Farm adopts as a commercial hub (bar, restaurant, guided tours, fruit and vegetable market) and research center (educational workshops) contribute strongly to the economy of Conegliano and also create jobs. This framework created also serves as a source of attraction for various stakeholders, such as universities and retailers. Not only from the cultivation process inside the urban farm, but also through the innovative architectural elements.
The activities related to agricultural production as laboratories but also spaces for discussion and scientific research, create a stimulating and multidisciplinary environment and increase the social value of the neighborhood, improving the quality of life of citizens.
The structure becomes a meeting point for people of different ages, but whose common goal is the learning of new agronomic and technological knowledge. We want to communicate how to produce food in a healthy way informing them in various ways on the importance of knowledge and production of the food they consume. To achieve this, we introduce laboratories, workshop areas, theoretical and practical courses as well as an enormous vision of the production area, which is visible in the south block and approaches the individual processes to the visitor.

#### 4.1.2. WHY INVESTING IN OUR URBAN FARM?

We find ourselves in a world that is increasingly threatened by the consequences of a steady population growth, an increase in urbanization and high global CO2 emissions, which will lead to climate change. Since 42% of the Earth's surface is used for agriculture, this is the largest emitter of greenhouse gases and requires 70% of global water consumption. The structure is not only designed to reduce the energy demand, but also as a self-sufficient structure from the energy point of view
We believe that we must reach the highest goal and exploit the enormous but still almost unknown potential offered above all by microgreens. To date, research and development in the field of microgreens represent the possibility of producing a food good with high nutritional capacity through a reduced use of energy.

Furthermore, by creating the first agro-industrial center in the Veneto region, we believe in a citizens' collective accession. We also believe that, from an economic point of view, our project can be very attractive for potential investors and the municipality of Conegliano: while the former will receive financial compensation, the second will receive a place of social connection and agricultural production, all implemented in a sustainable way, which integrates perfectly with the constructive and productive trends of the future.
This last aspect is perhaps the salient point of our project: it does not want to be a "machine to earn", but a place where people are able to benefit from all kinds.

The receipts will be guaranteed by the Bistro, which in addition to ensuring a catering service for lunch and dinner will also be open for happy hours and breakfasts. Thanks to the productions, presented in point 2.4, the products will be sold directly within the urban farm. In addition to real money inputs, the team believes that social welfare, even if not translatable into economic matters, but is still a fundamental "entry".
The gains are therefore not only economic and social, but also cultural. Inside the tower some spaces will be destined to students, start-ups and universities with the aim of promoting scientific innovation in the field of food production in urban systems and develop projects on multi-functionality in companies. In these spaces research will be carried out in particular on indoor cultivations, on efficient cultivation systems in the urban system and on many other topics concerning the production of food. These actors (students, start-ups and universities) will have a double advantage: from a side will have a space in which to experiment, on the other hand, the experimentation will take place under the eyes of all visitors who will be able to use the glazing systems made at most of the didactic events.

### 4.1.3. CONCRETE EARNING- CONCEPT: BUSINESS PLAN AND OPPORTUNITY

Our plan is based on the supply of products and services, which will implement our proposal. Our products will therefore be the starting point, as thanks to the crops we could guarantee a service where the harvest will be processed instantly. Thanks to the use of microgreens above all, there will also be the introduction of production innovations, which are still not widespread in the Italian GDO.
By creating particular recipes with our products, inserting them into the offer of restaurants and positioning ourselves in a regional market, we aspire to the creation of a brand that can convey the environmental sustainability that exists in every process of realization.
To ensure consistency of our sustainable concept in the use of the building, the mandatory requirements for people who are interested in renting the space dedicated to catering:

- Solid economic base, which can guarantee secure payments and efficient services
- Low environmental footprint to pursue the ecological idea of our project
- Technical knowledge of the production system, ensuring efficient management of resources.

To summarize, those who intend to start a business in the building will have to share our core values on which our project is based.

### 4.1.4. SALE CHANNELS

The sale of our products will take place through two sales channels: a sort of market inside the building and an eventual home delivery to private individuals or companies in the surrounding areas. The internal market is represented both by the points of sale to the public and by the restaurant business. Wanting to promote the reduction of CO2 emissions due to transport, delivery will only take place within the municipality of Conegliano. A website will also be created in which customers can book and purchase products, pick them up in the tower's internal markets or send them home. The same site will also be used by the activities within the structure to sell and / or promote its services and products.

### 4.1.5. POTENTIAL BUSINESS PARTNERS

The partners who can participate in our project can be:

- Universities and educational institutions: spaces will be set up in the center for universities where they can experiment with methods and technologies
  for food production. We want to ensure that the universities participate actively promoting the dissemination of knowledge and culture in the center and in the universities but also national limits. These spaces represent an opportunity for the university itself: by exposing their knowledge to possible interested parties who will visit the center, a bridge can be created between the academic world and the world of work. We believe that university participation is also useful for all students who live in the neighborhood and encourages visitors.
  Depending on the difficulty levels will also be included routes and workshops dedicated to higher institutes, above all to agricultural institutions, which have seen significant growth throughout the Italian territory.
- Professionals: the spaces for professionals are various (production laboratories, experimental laboratories, conference rooms and exhibition galleries). As a fundamental requirement we will ask the company to show us that the use of the space will be dedicated to activities that do not contrast the ideals of the project.
- Common citizens: even the ordinary citizen, upon communication and presentation of the planned activity, may have the opportunity to propose projects, events or activities, but will have to respect certain sustainable directives. We also remind that, in addition to this, citizens will have the opportunity to use all public spaces such as gardens and areas dedicated to relaxation.



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### 4.2. VALUE CHAINS

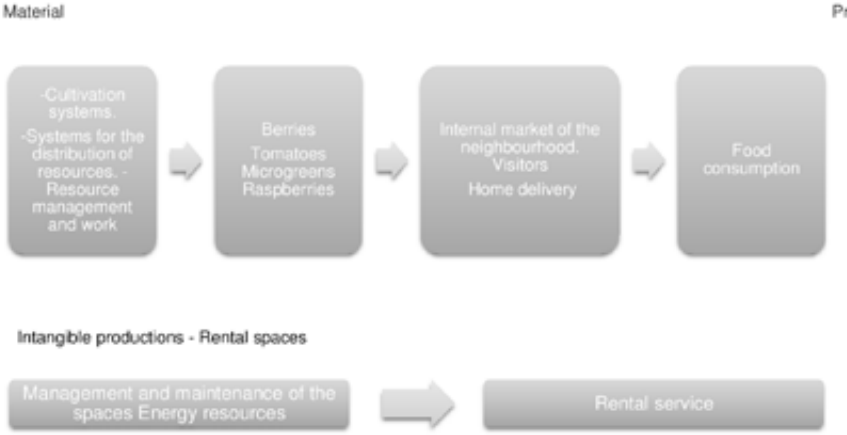
The value chain model considers the creation of value as a process of transforming inputs into outputs. In our project, this situation will be predicted:

Concrete production: in this case the types of resources are extremely dependent on the production that we will take into consideration. Inside our urban farm we can count a total of 4 different productions different cultivation systems. It is important to remember that, as regards the production of microgreens, various vegetable varieties will be grown. For these productions, the value chain starts from the necessary resources and cultivation systems:

1. Cultivation systems: hydroponic system, multilayer system with substrate.
2. Systems for the distribution of resources; for the production of plants, pumps for the movement of water and fertigation, relative pipes, tanks for the concentrated solution, heat pumps, air conditioning systems and software for the management of the vegetative cycles.
3. Resources; the necessary resources will be water, CO2, electricity and fertilizers.
4. Management and work.
5. Machines to facilitate collection and measuring instruments.

From these inputs, we obtain plant productions, which will then be sold through our domestic market; through the website and through the refreshment points. Therefore, considering the home delivery of part of the production, we have other inputs related to work, transport and energy needed for transport.

Regarding the intangible productions (services offered), however, in this case the inputs are very different and differ depending on the service of the product.
In fact, in the case of leased spaces, we must consider the costs necessary for the management and maintenance of spaces, and the necessary energy resources.
In the case of laboratories organized instead, in addition to the costs of management and maintenance of space, we must also consider the wages of those who organize the courses, the costs of materials necessary for the course and also the costs for the necessary energy resources.
Another intangible production is the energy produced by the energy generation system through photovoltaic systems and solar panels.

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Intangible productions - Organized workshops


Intangible Production - Energy


## 4.3. BUSINESS PLAN

Considering the estimates made on possible costs and revenues, the investment is convenient: these costs can be extremely variable and we did not want to make estimates that would certainly not be realistic. As for the production section, most of the cultivation systems are widely used in many types of agricultural production and, for these, the data derive from reliable sources. The costs and revenues from the production section, however, are interesting because they allow you to earn 13 millions of euros in the first 10 years (considering both the profit of the production section and that deriving from the services) : these earnings will manage to cover the investment. Probably the gains will be greater because in the estimation of production costs we have chosen:

- We have used information that also takes into account the energy costs that, in our project, will be widely covered by the use of renewable energy (photovoltaic panels and solar panels) and resource management systems based on optimization.
- The sales prices taken into consideration are the prices we find in large retailers: they are therefore relatively low and very competitive prices. Our project allows to transform the area into a tourist attraction and this allows to increase the sales prices to the final consumer
- we have also considered, the possibility to gain profit from waste materials of the productions (organic compost) that if produced in excess can be bagged and sold as a soil improver.

The main purpose of the business plan is to calculate the profit over the years, in order to have an overview of the economic feasibility of the project. This reflects our approach based on the concept of sustainable development, where environment, society and economy are closely interlinked. To do this, the table below summarizes all initial revenues and costs(distributed in the 1st, 5th 10th and 20th years) and production costs for all the crops we are going to grow.
Finally in addition to the profit that we will get from the productions mentioned above. The center has set itself the objective of obtaining from the rental of the exhibition areas and the conference room an amount of approximately 50.000,0€ year. This is the result of an estimate calculated on the basis of average rental prices in the Conegliano area and, on the basis of a wish to have some areas of the building occupied for 35% of the year.
We are fully aware of the high upfront costs for the project, but our data shows that, revenues from product sales, labs and rental space (see tables below) can be extremely substantial. Moreover, in our vision the costs will be lower and lower over the years, as we want to create a sustainable circular system with the ability to self-organize and economic impacts. With the support of an appropriate marketing strategy (digital but not only) to publish our project, the structure could even become an example to follow, attracting visitors and experts not only from Italy but also from the rest of the world. This could lead to a steady increase in popularity, visibility and, consequently, profit.



CONEGLIANO - EX ZANUSSI AREA
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| CROP | REVENUES BASED ON GDO PRICES (€ YEARS) | 1° HYPOTHESIS: PRICE HIGHER THAN 20% COMPARED TO THE GDO (€ YEARS) | INITIAL AND PRODUCTION COST (€ YEARS) |
|---|---|---|---|
| **Tomatoes "Cardinale"** | 8.766,0 | 10.519,2 | 50.940,0 |
| **Tomatoes "Honeydrop"** | 5.844,0 | 7.012,8 | |
| **Tomatoes "Black Russian"** | 5.259,6 | 6.311,5 | |
| **Berries : "Annabelle", "Anais", "Diamond", "Marmolada"** | 94.800,0 | 113.760,0 | 89.500,0 |
| **Microgreens:** | 1.215.000,0 | 1.458.000,0 | 74.250,0 |
| **Raspberries:** | 27.600,0 | 33.120,0 | 21.200,0 |
| **TOTAL REVENUE:** | 1.357.269,6 | 1.628.723,5 | 235.890,0 |

| | After 1st year | 5 Years | After 10 Years | After 20 years |
|---|---|---|---|---|
| **Profit from crops (€)** | 1.121.379,6 | 6.074.658,0 | 11.213.796,0 | 22.427.592,0 |
| **Profit from crops (€) 1° Hypothesis** | 1.392.833,5 | 6.252.477,5 | 13.928.328,0 | 27.856.656,0 |

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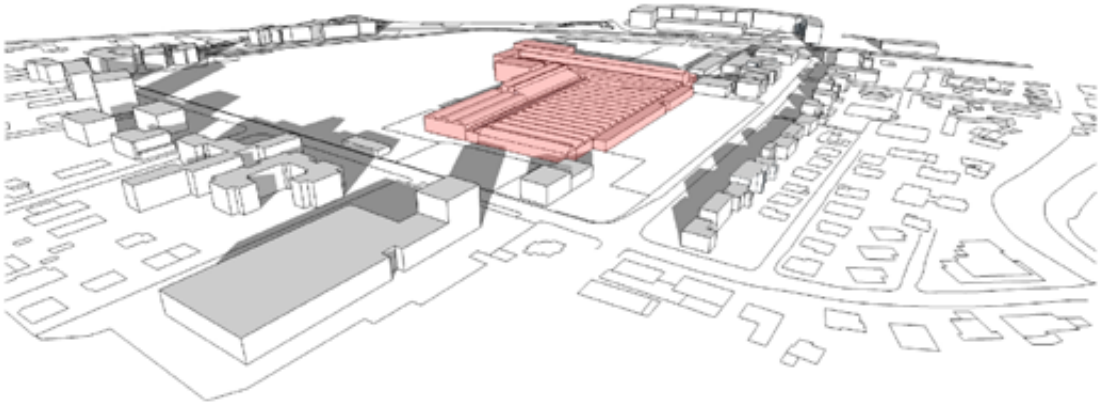
| CULTIVATION SYSTEM | CROP | OCCUPED AREA ($m^2$) | OUTPUT | REVENUES BASED ON GDO PRICES (€ YEARS) |
|---|---|---|---|---|
| **Hydroponic system** | Tomatoes | 487 | Fresh product, Tomato sauce | 19.869,0 |
| **Hydroponic system** | Raspberries: | 400 | Fresh product | 27.600,0 |
| **Organic substrate** | Berries | 1133 | Fresh product, Jam | 94.800,0 |
| **Hydroponic system** | Microgreens | 2250 | Fresh product | 1.215.000,0 |
| | | | € years | 1.357.269,0 |

| SERVICES THAT ALLOW ECONOMIC INCOME | OCCUPIED AREA ($m^2$) | RENTAL PRICES (euro total $m^2$ $month^{-1}$) | PERIOD (years) | ESTIMATION OF PROFITS (euro period of rental; $years^{-1}$) |
|---|---|---|---|---|
| **Rented space for Bistrot** | 555 $m^2$ | 2.500 euro | 5 | 150.000 euro |
| Educational Ort Laboratory | 514 $m^2$ | 200 euro | 3 | 7.200 euro |
| **Rented space for Market (50 stands)** | 1452 $m^2$ | 100 euro | 0.1 | 5.000 euro |
| **Rented space for Expositions** | 1555 $m^2$ | 5.000 euro | 5 | 300.000 euro |
| **Rented space for Library** | 163 $m^2$ | 200 euro | 3 | 7.200 euro |
| **Rented space for Coworking (80 people)** | 88 $m^2$ | 50 euro < x < 200 euro | 0.1 | 2000 euro < x < 4000 euro (if all the places places are rented by 8 people groups) (if all the places are rented by one only person) |
| **Conference and Projections area** | 201 $m^2$ | 270 euro | Per day | 1080 euro (Presuming 4 days rented in a month) |

| | |
|---|---|
| **TOTAL PROFIT (ESTIMATION) Euro in 5 year** | **2.584.800 euro** |

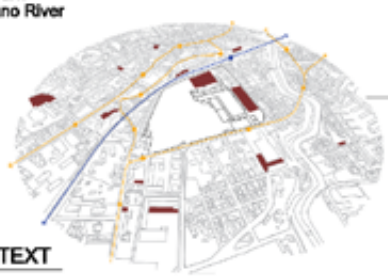
# Annexes

# EX ZANUSSI AREA
## *CONTEXT*



In the centre of Conegliano Veneto, there's a building in a complete state of abandonment:
it is the Ex-Zanussi area, a symbol of 1960s economic growth, but now in a complete decadence.
The lot represent a real "urban chasm" but, at the same time,
it is the arrival to the city for those coming from South.

**NATURAL CONTEXT**
- Urban park
- Monticano River



**FACILITIES**
- Rail
- Bus
- Parking

**URBAN CONTEXT**
- Residences
- Public services
- Industries
- Abandoned spaces



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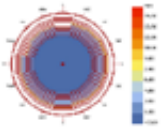
# EX ZANUSSI AREA
## *CONTEXT*

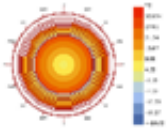
N


Our project involves the design of an innovative urban farm: by using new technologies, we want to create a sustainable, original and aesthetically pleasing space which can guarantee local development from a social, environmental and economic point of view.
One decisive aspect to make our project work is certainly the active participation of citizens: they should all feel welcome to participate to the activities and the initiatives of the structure regardless of their social background, ethnicity, origins or age.
Some people can also consider the urban farm as a real, full-time work: the rebirth of this structure will create new jobs and new professional figures will be needed.
Plus, it will help renovating a district of the city that is now considered as a degraded and disconnected.

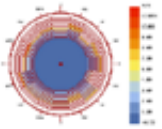
## *WIND-ROSES AND SUNPATH*



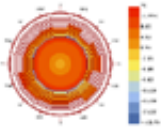
Wind speed (m/s)
1 jan 1:00 -
31 dec 24:00
Calm for 68% of the time (5965 hours)



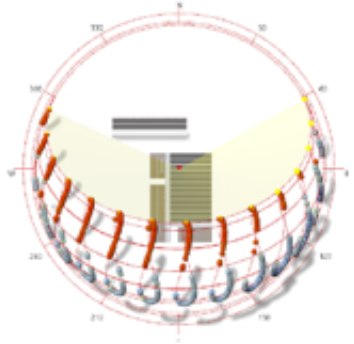
Thermal climate index (°C)
1 jan 1:00 -
31 dec 24:00



Wind speed (m/s)
Coldest month
1 jan 1:00 -
31 jan 24:00
Calm for 68% of the time (508 hours)



Thermal climate index (°C)
Coldest month
1 jan 1:00 -
31 jan 24:00
Calm for 68% of the time (508 hours)



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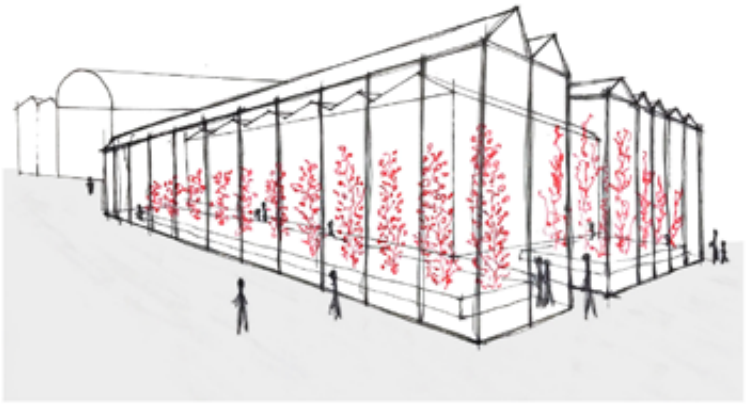
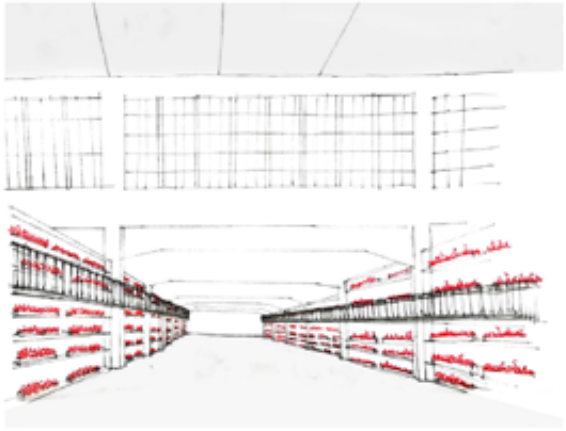
# URBAN FARM
## *CONCEPT*



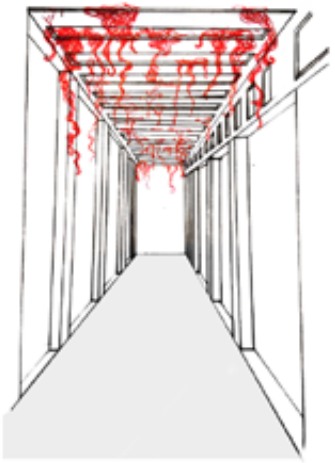
### 1. BERRIES AND TOMATOES GREENHOUSES

New volumes will be added to the existing structure: three light polycarbonate greenhouses. These, thanks to the innovative technologies used, will ensure a better development of production within the agricultural context of the country. The shed are oriented towards the East, rotated by 90° compared to the concrete roofing: in this way a dynamic, moving effect is created.



### 2. MICROGREENS GREENHOUSES

Our project foresees the lowest possible number of demolitions: in order to reduce the costs of labour, materials and transport, and to keep the history of the Zanussi Foundry symbolically alive.
We will re-use the most of the existing spaces and organize the re-functionalisation of the buildings, thus elevating them to "industrial archaelogy buildings".



### 3. VENTILATED HALLWAY

The hallway consists of a simple metal structure that will ensure the separation of the rooms without preventing the passage of air and light. The roof will be covered with climbing plants that will act as a schielding from sun and rain.



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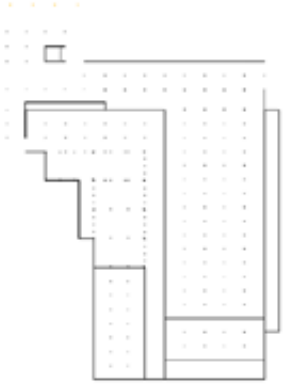
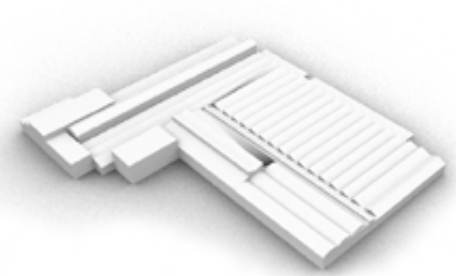
# DEMOLITION AND REBUILDING

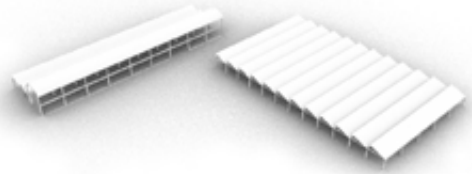


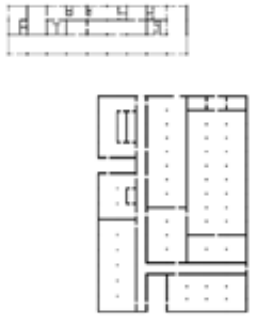
Current situation
23 225 sm



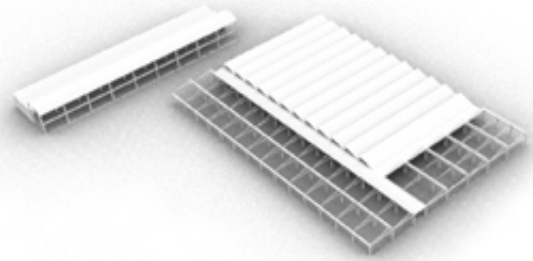
Demolition
14 698 sm

Rebuilding
4350 sm

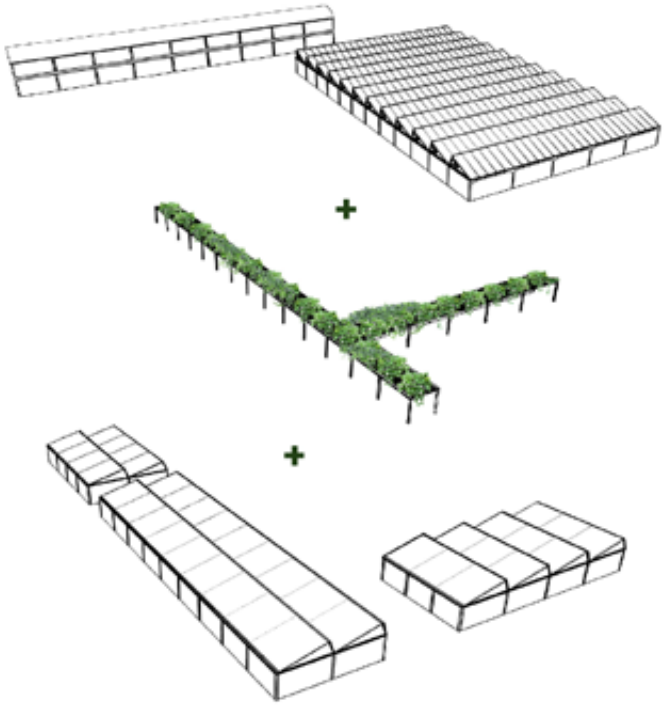




Project
12 804 sm



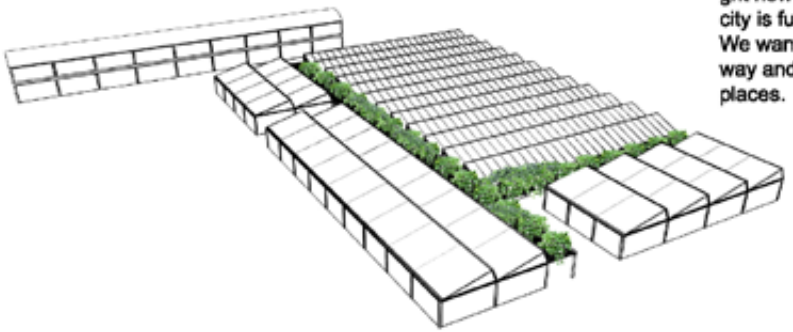
# ARCHITECTONIC CONCEPT



Our project limits demolitions: pre-existing buildings have been maintained in their form for their aesthetic and historical relevance. Green smog-eating walls will be installed on two sides of the old building, to the East and North.

We want to keep evident the link with the history of the place: between the pre-existing body and the new buildings, we insert an airy corridor that serves as a ventilated filter between the two zones. The roof of the corridor will be covered with climbing plants that will act as a decorative element and shielding from the sun and rain.

Then we add new volumes: light transparent greenhouses in polycarbonate are placed in optimal positions to capture most of sun rays throughout the arc of the day.



We achieve an integration of architecture and agriculture and highlight how the theme of green in the city is fundamental for us.
We want to build in a sustainable way and respecting the identity of places.



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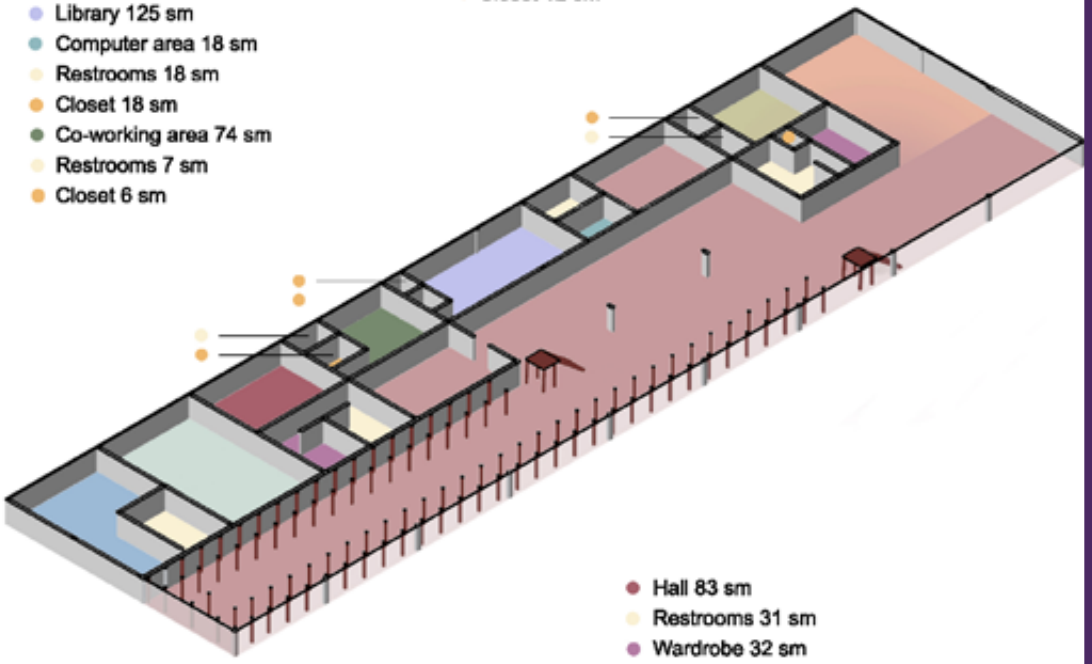
# FUNCTION AND DISTRIBUTION OF COMMUNITY SPACES
## *NORTHERN BLOCK*

- Exhibition gallery 1555 sm
- Info-point 183 sm
- Wardrobe 32 sm
- Restrooms 47 sm
- Closet 5 sm
- Departments 175 sm
- Restrooms 12 sm
- Closet 12 sm

- Library 125 sm
- Computer area 18 sm
- Restrooms 18 sm
- Closet 18 sm
- Co-working area 74 sm
- Restrooms 7 sm
- Closet 6 sm



- Hall 83 sm
- Restrooms 31 sm
- Wardrobe 32 sm
- Conference and screening rooms 172 sm
- Restrooms 30 sm
- Hub 135 sm

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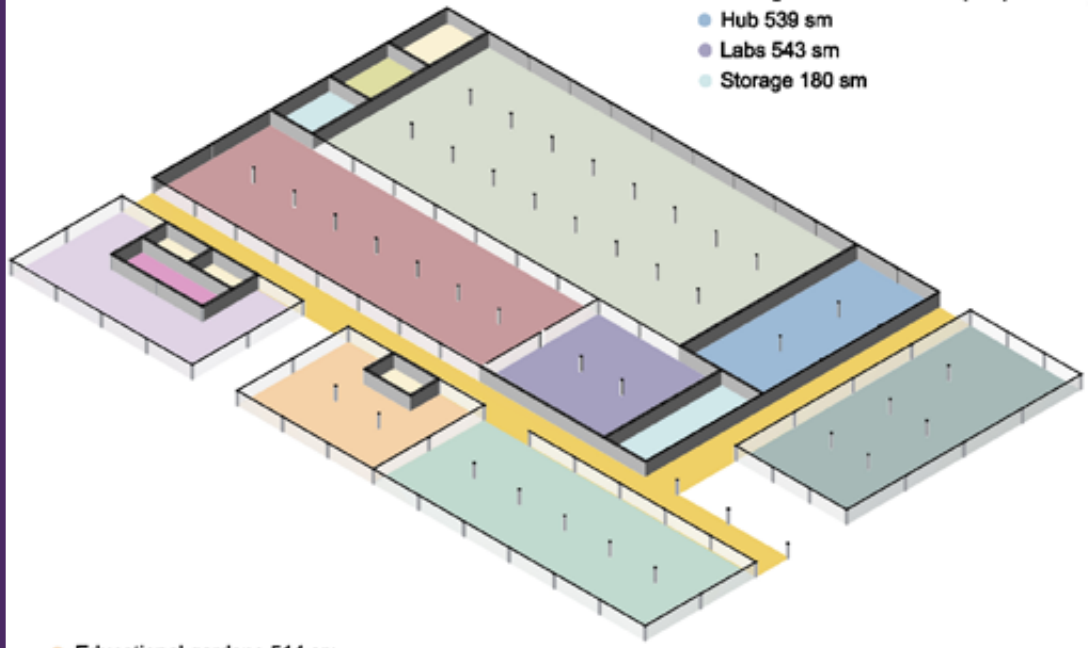
# FUNCTION AND DISTRIBUTION OF COMMUNITY SPACES

## *SOUTHERN BLOCK*

- Market space 1452 sm
- Hallway 946 sm
- Bistro 555 sm
- Kitchen and lockerroms 89 sm
- Restrooms 89 sm

- Hall 86 sm
- Restrooms/lockerrooms 86 sm
- Storage 86 sm
- Microgreens Greenhouse (Led) 2454 sm
- Hub 539 sm
- Labs 543 sm
- Storage 180 sm



- Educational gardens 514 sm
- Restrooms 43 sm
- Berries Greenhouse (West) 1133 sm
- Tomatoes Greenhouse (South) 974 sm



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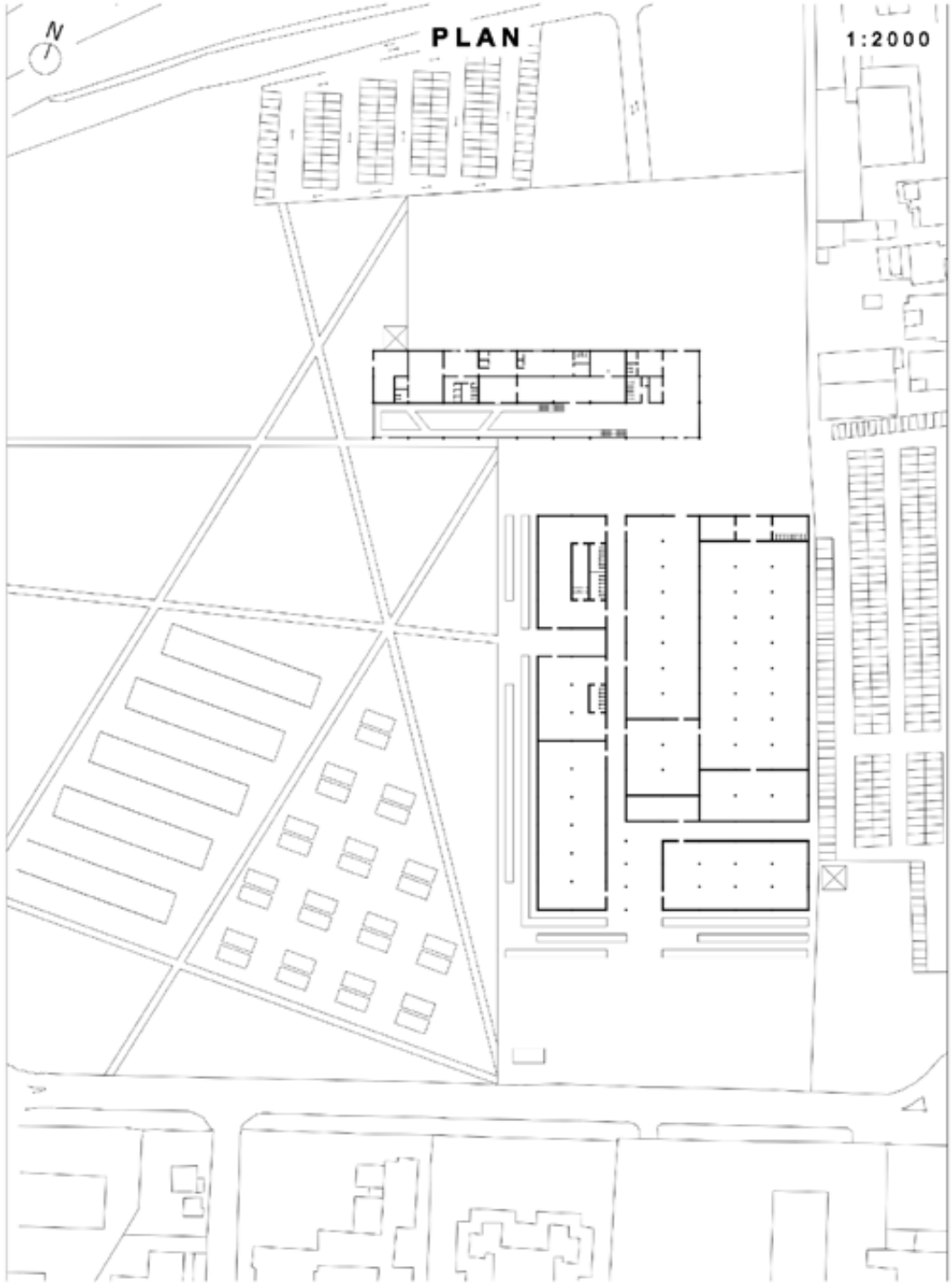
PLAN 1:2000



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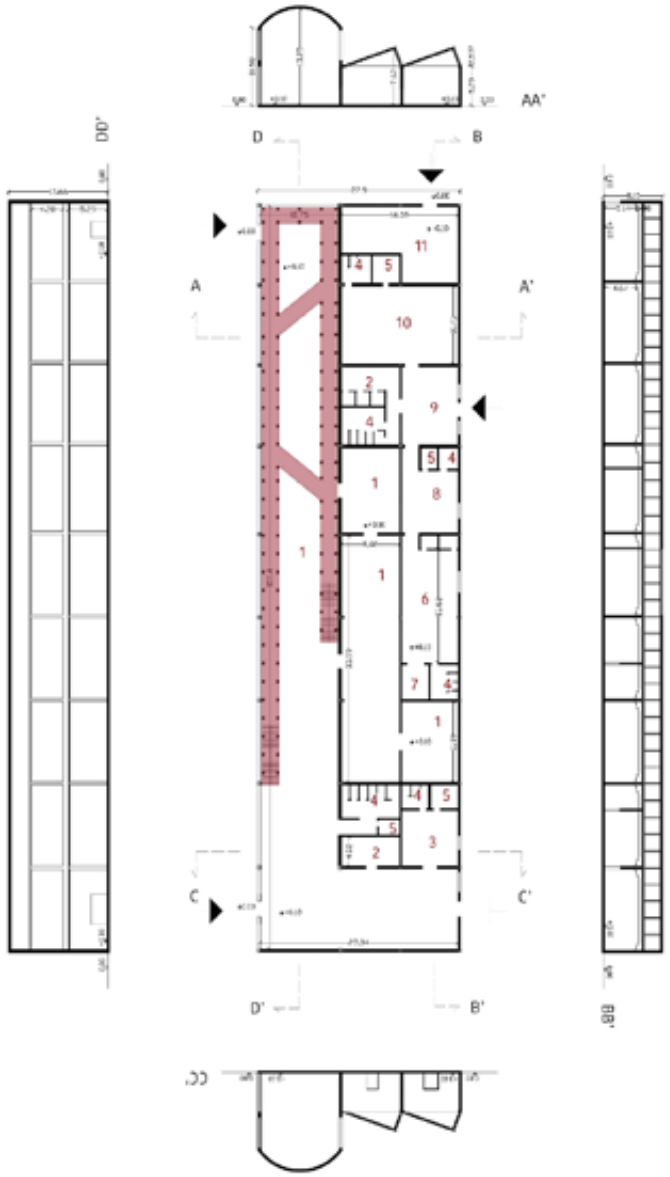
# SECTIONS
## NORTHERN BLOCK

1:1000




1. Exhibition gallery
2. Wardrobe
3. Info-point
4. Restrooms
5. Closet
6. Library
7. Computer area
8. Co-working area
9. Hall
10. Conference and screening rooms
11. Hub



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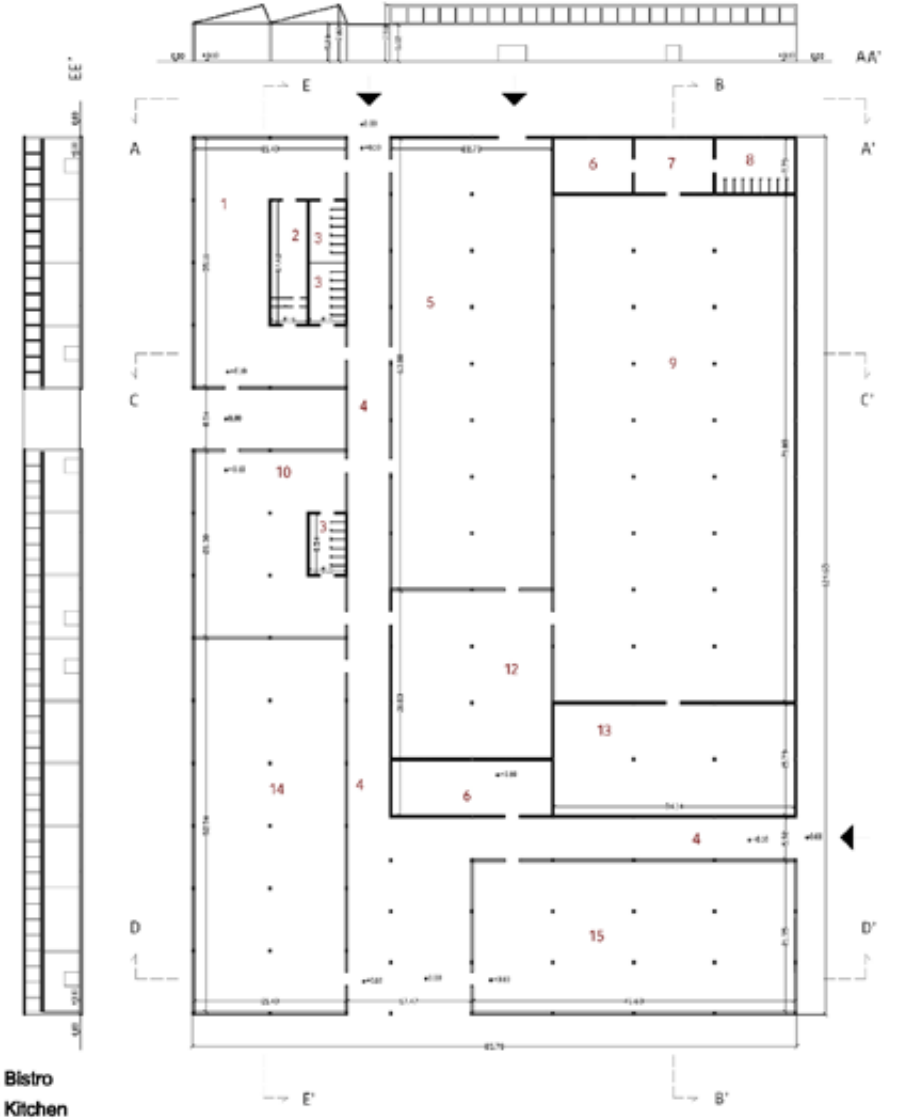
45° 53' 14" N 12° 17' 49" E

# SECTIONS
## SOUTHERN BLOCK

1:1000




1. Bistro
2. Kitchen
3. Restrooms
4. Hallway
5. Market space
6. Storage
7. Hall
8. Restrooms
9. Microgreens Greenhouse
10. Educational Gardens
11. Restrooms
12. Labs
13. Hub
14. Berries G.h.
15. Tomatoes G.h.

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# GREEN CONCEPT
## *SMOG-EATING WALL*

The "Living Wall" contributes to the reduction of noise and reverbaration, thus greatly reducing noise pollution in generale, a growing problem for cities.

It creates a pleasant climate comfort: it induces to perceive lower temperatures than those indicated by the thermometers.

It limits the occurence of the heat island phenomenon. Thanks to the evapotranspiration of plants, it reduces the effect generated by the surfa-

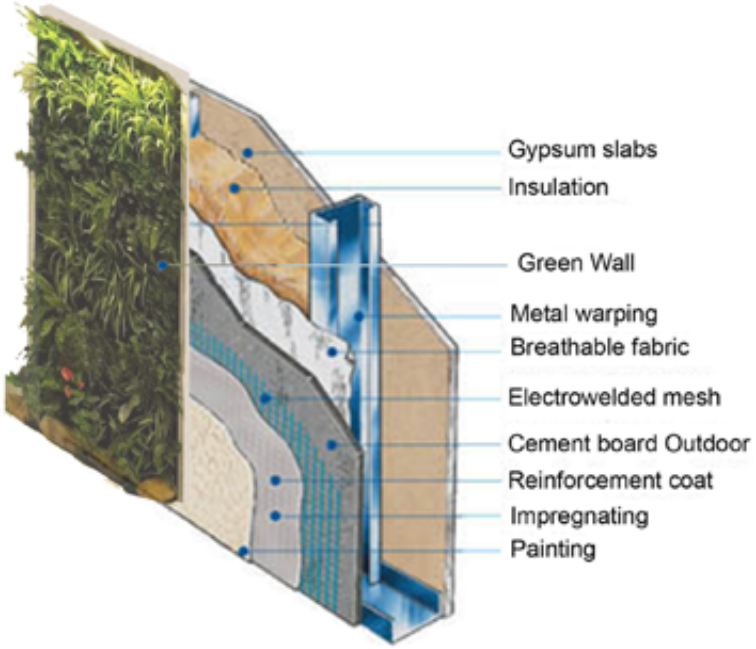
Located to the North and East, the Living Wall is a kind of natural barrier for cold winds.

If covered with plants suitable for housing urban microfauna, the Living Wall could help to create small biological corridors within the urban center.

As its name suggests, the anti-smog wall has a strong purifying power: it filters pollutions and produce oxygen, purifying the air

It is an important decorative element, providing a second, coloured skin for the pre-existing structure and contributing to urban regeneration.

Thanks to its properties, this green wall saves energy and reduces the cost of managing the building. Its maintenance is not demanding or expensive.



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45° 53' 14" N 12° 17' 49" E

# WATER CONCEPT
## *WATER GARDENS*

Water gardens are a particulare decorative and scenic element: they have bene an attraction in private and public gardens since ancient times, especially because of their intrinsic symbolic meanig of purification and healing

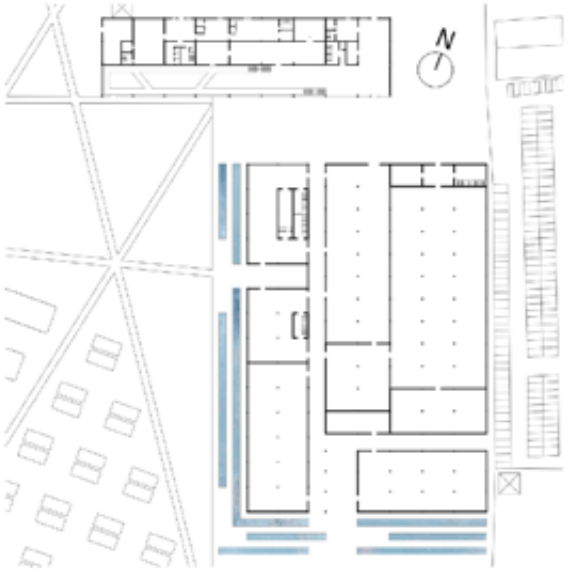
Water gardens can have an important influence on the microclimate: in summer they mitigate the temperatures.

They absorb noise, attenuating the noise pollution typical of overcrowded spaces, as in the casse of offices and shopping centres. Present in many zen gardens, they have a relaxing function, both visually and acoustically.

The solar rays reflect on the water surface and affect the glass of the tomatoes and berries greenhouses: thse increase their productivity, thanks to the greater amount of heat and sunlight.

Water gardens will be equipped with aquatic plants for phytodepuration: these plants start a process to obtain a quality water, purified from waste organic substances, pathogenic bacteria, viruses, heavy metals.

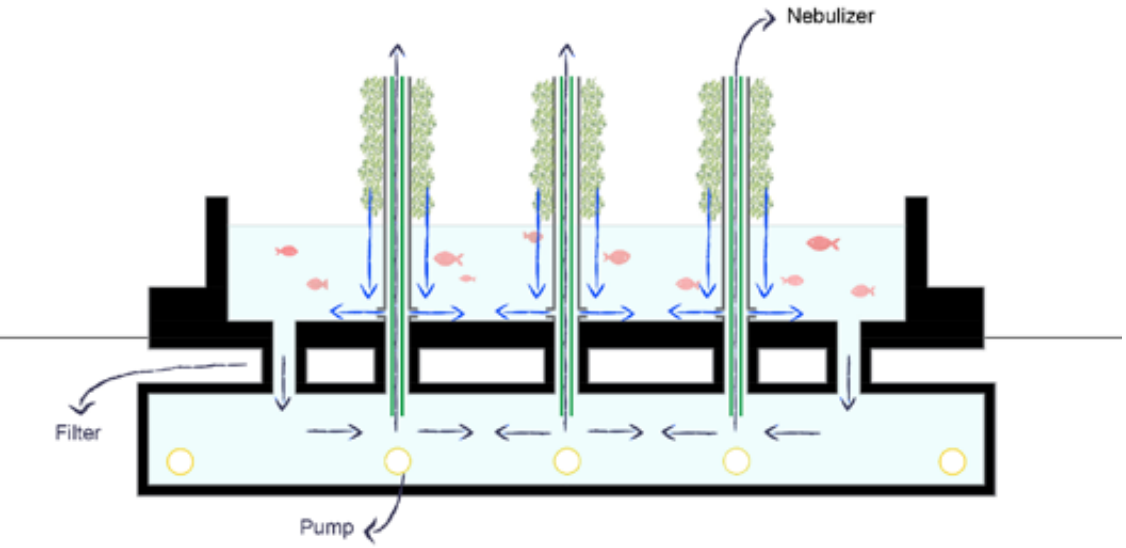
They are fed by the rainwater recycling system: in order to save maximum resources, there will be tanks that will distribute water for domestic and sanitary use.




# AQUAPONIC
## *CULTIVATION SYSTEM*


**ADVANTAGES**

- Use 1/6th of the water to grow 8 times more food per acre compared to traditional agriculture!
- All natural fertilizer source from fish waste.
- No reliance on mined and manufactured fertilizers.
- Efficient, sustainable and highly productive.
- Produce is free of pesticides and herbicides.
- Fish are free of growth hormones and antibiotics.
- Allows continuous production of food.
- Produces both a protein and vegetable crop.
- Integrated system is sustainable and earth-friendly.
- Eliminating soil eliminates soil borne diseases.
- When combined with Controlled Environment Agriculture, you can grow year 'round in any climate




**WHICH**

Trout Tilapia Prawns



ZERO+
CONEGLIANO - EX ZANUSSI AREA
45° 53' 14" N 12° 17' 49" E

# WATER CYCLE

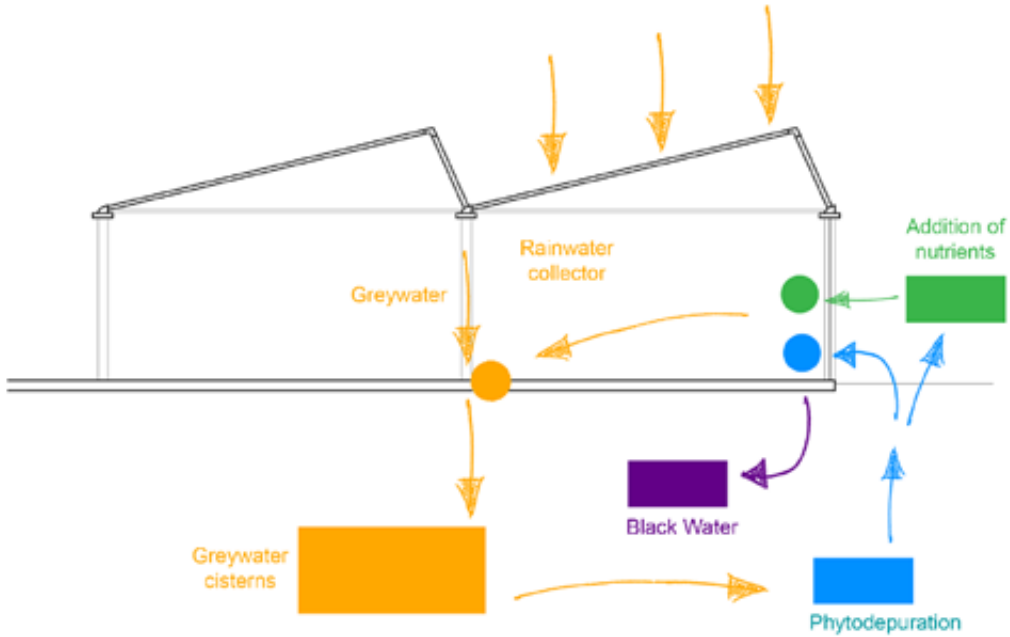
Water collection scheme


Surface area of roofs = 10.247 m²
Average mm fallen in 3 years = 1.159,8 mm
Average m fallen in 3 years = 1,159 m

Volume of water falling on the surface

1,159 m x 10.247 m² = 11.876,3 m³

because 1 m³ of water corresponds to 1.000 l




- Greywater facilities and production
- Production
- Potable facilities

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45° 53' 14" N 12° 17' 49" E

# PRODUCTION SYSTEMS
## *STRAWBERRIES*

STRAWBERRIES

### ADVANTAGES

1. Bolsters the IMMUNE SYSTEM
2. Strengthens HEART HEALTH
3. Balance HORMONES
4. Preserves your MEMORY
5. Reduces INTESTINAL PROBLEMS
6. Shields skin from SUNBURN
7. Reduces INFLAMMATION

### WHAT

- Annabelle
- Marmolada
- Anais
- Diamons

### HOW

Cultivation on traditional organic substrate indoor

### WHY

Strawberry prefers to be grow on organic substrate compared to hydroponics

### WHERE

1133 ms

### BENEFITS



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45° 53' 14" N 12° 17' 49" E

# PRODUCTION SYSTEMS
## *RASPBERRIES*

RASPBERRIES

### ADVANTAGES

1. BOOST HEART HEALTH
   The anyhocyanin in raspberries provide anti-infiammatory benefits that boots heart health and improve blood flow.
2. HELP WITH WEIGHT LOSS
   The phytonutrients in raspberries help increase metabolism.
3. CAN HELP MANAGE DIABETES
   The anyhocyanin in raspberries provide anti-infiammatory benefits that boots heart health and improve blood flow.
4. MAY HELP PREVENT CANCER
   The ellagic acid and anthocyanin have both shown anti-tumor and chemopreventive properties.
5. EASE ARTHRITIS PAIN
   Raspberry polyphenols are anti-infiammatory and have been shown to reduce the symptoms and severity of arthris.

### WHAT

- Glen Clova and Moy
- Malling Exploit and Promise
- Autumn Bliss
- Rossana
- Himbo top
- Heritage
- Japanese Wineberry

- Kiwigold
- Herbest Gold

- Cumberland
- Explorer

### HOW

Inert substrate (perlite and coconut fibre) with closed-loop hydroponic system

### WHY

The drained solution is collected and then put back into circulation, after filtration and disinfection, obtaining a saving of water and nutrient and a lower environmental impact.

### WHERE

974 ms

### PROPRIETIES

VITAMINS
Vitamin C 44%
Vitamin K 10%
Folate 5%
Vitamin E 4%

MINERALS
Manganese 34%
Magnesium 5%
Copper 4%
Iron 4%

NUTRIENTS
Dietary fiber 26%
Carbohydrate 4%
Calories 3%
Protein 2%

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# PRODUCTION SYSTEMS
## *TOMATOES*

### TOMATOES

**ADVANTAGES**

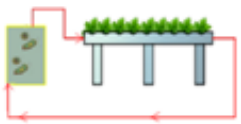
- Helps to prevent high blood pressure
- High water and fiber levels help with healthy weinght loss
- Rich in vitamins A, C, potassium, dietary fibers and manganese
- Its potassium helps the body to protect and take care of the heart
- Its vitamine B3 helps to prevent Alzheimer's disease
- Helps with oily skin and can be used to prevent acne

**WHAT**

- Budenovka
- Black Prince
- Cardinal
- Honey Drop
- Black Russian

**HOW**

NFT Hydroponic



**WHY**

Saves water and **nutrients**

**WHERE**

974 ms

Nutritive solution

Table of nutritive solution to be applied to tomato culture Dosage elements in m³

| Elements | Dosage in m³ |
|---|---|
| N(NO3)- | 12,50 |
| N(NH4)+ | 0.5 |
| P(H2PO4)- | 1.00 |
| P(HPO4)-- | 0.50 |
| K+ | 6.35 |
| Ca++ | 7.65 |
| Mg++ | 2.00 |
| So4-- | 2,.0 |



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# PRODUCTION SYSTEMS
## *MICROGREENS*

### MICROGREENS

**LIGHT**

Generally, microgreens requires 12 hours of light that is provided by LED lamps with a light spectrum suitable for plant photosynthesis at least 80-100 µmol/m2/s of PPFD (Photosynthetic Photon Flux Density).

POSSIBLE SPECTRUM DATA

| | |
|---|---|
| UV < 400 nm | 0 % |
| Blue 400-500 nm | 12% |
| Green 500-600 nm | 19% |
| Red 600-700 nm | 61% |
| Far-Red 700-800 nm | 8% |
| PAR 400-700 nm | 92% |
| CCT Kelvin | 2000 |
| R:FR Ratio | 5,5 |

THE ADVANTAGES

**WHAT**

- Common amaranth
- Red garnet amaranth
- Sea beet
- Borage
- Wild chicory
- Watercress
- Wasabi
- Radish daikon
- Mustard dijon
- Kale red
- Cabbage red and green
- Broccoli
- Spinach
- Green basil and opal basil
- Popcorn shoots
- Rocket or arugula
- Red veined sorrel

**HOW**

Germination Chamber in Vertical Farm

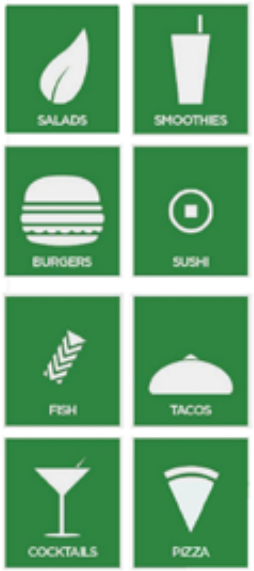
**WHY**

Being low height vegetables can be grown on several floors thus increasing production per m2. We noticed that marke demand for this product is increasing. This products guarantee a helathy and nutritionally rich food.

**WHERE**

2454 ms

WHERE TO USE THEM

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# RENDER
## /

*The park and the greenhouses*



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# RENDER
## //

*The exhibition gallery*

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# RENDER
## *III*


*The Living Walls*

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# RENDER
## *IV*


*The Green Hallway*

ZERO+

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**RENDER**
*V*

*The LED production area*

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# NATURAL WINES EVENT

CONEGLIANOVENETO
INNOCENTE PITTONI STREET
EX ZANUSSI ZOPPAS AREA

# ART & WINE

## ON 30 MARCH 2019

EXHIBITION GALLERY

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**Figures:**
Each picture is labelled with "fig."
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# THE GRAND FINALE

Grand Finale took place at the NovelFarm expo in Pordenone Exhibition center on February 13-14, 2019. The jury selected teams presented their project via pitch presentation.

At Grand Finale there were exhibition booths available for each team as an opportunity to present their projects to the public (and gain extra points). Groups were asked to bring in representative materials as prototype, poster, etc.

Presentation for the finals consists in a 5 minutes summary. The 3-minute video could also be used as the total freedom on how to organize the pitch was given to the teams. Each of the teams presented its project to the public and jury. Finalists (one per each location) accessed the final dueling debate for the first, second and third prize.


Victory Garden


INTERNATIONAL CONFERENCE & TRADE SHOW
FOR NEW GROWING SYSTEMS,
SOILLESS AND VERTICAL FARMING
PORDENONE FIERE EXHIBITION CENTER
#NVF19
Sala NOVELFARM


VOTE

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# PHOTOS


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CONEGLIANO
PHOENIX
NOVEL FARM
Phoenix
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L'AZIENDA ZANUSSI


cultivation
Outdoor cultivation
Mushroom greenhouse
activities
Brewery
3%
of total income
10%
of total income
14%
of total income

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International workshop on vertical farming

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www.wur.eu/vertifarm2019

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HORTITHERAPY2019

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*Venice, Italy*
*3-5 October 2019*

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https://site.unibo.it/hortitherapy/en/

# ContaminationLab

The "Banca del Monte e Cassa di Risparmio Faenza" Foundation is a private, nonprofit institution, which is committed to the development of the human, social, cultural, and economic capital of the city of Faenza and its surrounding territory. Its mission takes shape through a variety of actions and initiatives – such as grant-making, calls for projects, and in-house projects – within a strategy that covers a few major thematic sectors, namely youth education and training, scientific and technological research, arts and culture, welfare and public health.

The Foundation currently represents the historic and ideal heritage of the "Banca del Monte", a bank and charitable institution founded in the mid-fifteen century by the Franciscan Beato Bernardino da Feltre.

In the last few years, the "Banca del Monte e Cassa di Risparmio Faenza" Foundation has gradually re-focused its institutional action towards innovation and training of future generations. A crucial role is played by its own project named Contamination Lab, a startup pre-incubator founded in 2014 and aimed at facilitating the development of the creative and entrepreneurial skills of selected teams of local youths. Since 2018, through the Contamination Lab, the Foundation has also activated a project of regeneration of a green and agricultural area just outside the city centre, named S. Bernardino, aimed at transforming a wide rural space into a social and cultural place rooted in principles of entrepreneurial experimentation, social innovation, and environmental sustainability.

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Higher Education curricula on entrepreneurial urban agriculture?

An inventory of urban agriculture experiences in Western Balkans?

http://bugi.unsa.ba/

BUGI

western Balkans Urban aGriculture Initiative

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buono sano garantito

TESSERAMENTO 2019

COLDIRETTI

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A special thanks to all the professor and students from University of Bologna and University of Florence that made this challenge possible and successfull.

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